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A BEGINNER'S PSYCHOLOGY

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A BEGINNER'S PSYCHOLOGY

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BY

EDWARD BRADFORD TITCHENER

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To

THE MEMORY OF

THOMAS HENRY HUXLEY

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PREFACE

It is an acknowledged fact that we perceive errors in the work of others more readily than in our own. — LEONARDO DA VINCI

IN this Beginner's Psychology I have tried to write, as nearly as might be, the kind of book that I should have found useful when I was beginning my own study of psychology. That was nearly thirty years ago; and I read Bain, and the Mills, and Spencer, and Rabier, and as much of Wundt as a struggling acquaintance with German would allow. Curiously enough, it was a paragraph in James Mill, most unpsychological of psychologists, that set me on the introspective track, — though many years had to pass before I properly understood what had put him off it. A book like this would have saved me a great deal of labour and vexation of spirit. Nowadays, of course, there are many introductions to psychology, and the beginner has a whole library of text-books to choose from. Still, they are of varying merit; and, what is perhaps more important, their temperamental appeal is diverse.

I do not find it easy to relate this new book to the older Primer, — which will not be further revised. There is change all through; every paragraph has been rewritten. The greatest change is, however, a shift of attitude; I now lay less stress than I did upon knowledge and more upon point of view. The beginner in any science is oppressed and sometimes

disheartened by the amount he has to learn; so many men have written, and so many are writing; the books say such different things, and the magazine articles are so upsetting! Enviable is the senior who can reply, when some scientific question is on the carpet, — There are three main views, A's and B's and C's, and you will find them here and there and otherwhere! But as time goes by this erstwhile beginner comes to see that knowledge is, after all, a matter of time itself. If he keeps on working, knowledge is added unto him; and not only knowledge, but also what is just as valuable as knowledge, the power of expert assimilation; so that presently, when some special point is in debate, he is not ashamed of the plea of ignorance. He has learned that one man cannot compass the full range of a science, and he is assured that so-many hours of expert attention will make him master of the new matter. He comes in this way not, surely, to underestimate knowledge, but to be less anxious about it; and as that preoccupation goes, the point of view seems to be more and more important. Why is it that beginners in science are so often disjointed in their thinking, so often superficial, unable to correlate what they know, logically all at sea? There is no doubt that they are, whether they study physics or chemistry, biology or psychology. I think the main reason is that they have never got the scientific point of view; they are taught Physics or Biology, but not Science. Hence I have, in this book, written an inordinately long introduction, and have kept continually harping on the difference between fact and meaning. I try to make the reader see clearly what I take Science to be. It

does not matter whether he agrees with me; that is a detail; I shall be fully satisfied if he learns to be clear and definite in his objections, realizes his own point of view, and sticks to it in working out later his own psychological system. Muddlement is the enèmy; and there is a good deal of muddled thinking even in modern books.

Not that I offer this little essay as a model of clear thought! The ideas of current psychology and the words in which they find expression are still, in very large measure, an affair of tradition and compromise; and even if a writer has fought through to clarity, — past experience forbids me to hope that: but even if one had, — a book meant for beginners may not be too consistently radical; some touch must be maintained with the past, and some too with the multifarious trends of the present. There is something turbid in the very atmosphere of an elementary psychology (is the air much clearer elsewhere?), and it is difficult to see things in perspective. So the critic who will soon be saying that the ideal text-book of psychology has yet to be written will be heartily in the right, even if he is not particularly helpful. The present work has its due share of the mistakes and minor contradictions that are inevitable to a first writing; at many points it falls short of my intention, — *l'œuvre qu'on porte en soi paraît toujours plus belle que celle qu'on a faite;* and I daresay that the intention itself is not within measureable distance of the ideal. It is, nevertheless, the best I can do at the time; and it is also, I repeat, the kind of book that I should have liked to have when I began psychologising.

Psychological text-books usually contain a chapter on the physiology of the central nervous system. The reader will find no such chapter here; for I hold, and have always held, that the student should get his elementary knowledge of neurology, not at second hand from the psychologist, but at first hand from the physiologist. I have added to every chapter a list of Questions, looking partly to increase of knowledge, but especially to a test of the reader's understanding of what he has just read. I have also added a list of References for further reading. It depends upon the maturity and general mental habit of the student whether these references — made as they are, in many cases, to authors who do not agree either with one another or with the text of the book — should be followed up at once, or only after the text itself has been digested. The decision must be left to the instructor. My own opinion is that beginners are best given one thing at a time, and that the knowledge-questions and the references should therefore, in the ordinary run of teaching, be postponed until some 'feeling' for psychology, some steadiness of psychological attitude, has become apparent.

I have avoided the term 'consciousness.' Experimental psychology made a serious effort to give it a scientific meaning; but the attempt has failed; the word is too slippery, and so is better discarded. The term 'introspection' is, I have no doubt, travelling the same road; and I could easily have avoided it, too; but the time is, perhaps, not quite ripe. I have said nothing of the 'thought-element', which seems to me to be a psychological pretender, supported only by

the logicising tendencies of the day; and if I am wrong no great harm has been done, since a description of this alleged elementary process, by positive characters, is not yet forthcoming. My references are confined to works available in the English language; I think it unlikely that the students for whom this book is intended will have attained to any considerable knowledge of French or German. Lastly, — I believe that this is my last major omission, — I have referred only incidentally to the 'application' of psychology; for science is not technology, though history goes to show that any the least fact of science may, some day or other, find its sphere of practical usefulness.

Two of my illustrations are borrowed: the swallow-figure on p. 138 from Professor Ebbinghaus, and the cut on p. 282 from Dr. A. A. Grünbaum.

I am sorry to confess that a few of the quotations which head the chapters are mosaics, pieced together from different paragraphs of the original. Even great writers are, at times, more diffuse than one could wish; or perhaps it would be fairer to say that they did not write with a view to chapter-headings. I hope, in any case, that no injustice has been done.

It is a very pleasant duty to acknowledge the assistance that I have received from my Cornell colleagues, Prof. H. P. Weld and Drs. W. S. Foster and E. G. Boring, and from Dr. L. D. Boring of Wells College. I am indebted to all for many points of valid criticism, and I wish to express to all my sincere thanks for much self-sacrificing labour.

I have retained the late Professor Huxley's name in

the forefront of this new primer, partly as an act of homage to the master in Science, — the brilliant investigator, the fearless critic, the lucid expositor; and partly, also, as a personal tribute to the man it was my earlier privilege to know.

CORNELL HEIGHTS, ITHACA, N.Y.
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A BEGINNER'S PSYCHOLOGY

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CHAPTER I

PSYCHOLOGY: WHAT IT IS AND WHAT IT DOES

It is well for a man, when he seeks a clear and unbiassed opinion upon some certain matter, to forget many things, and to begin to look at it as if he knew nothing at all before. — LI HUNG CHANG

§ 1. **Common Sense and Science.** — We live in a world of values. We have material standards of comfort, and moral standards of conduct; and we eat and drink, and dress, and house our families, and educate our children, and carry on our business in life, with these standards more or less definitely before us. We approve good manners; we avoid extravagance and display; we aim at efficiency; we try to be honest; we should like to be cultivated. Everywhere and always our ordinary living implies this reference to values, to better and worse, desirable and undesirable, vulgar and refined. And that is the same thing as saying that our ordinary living is not scientific. It is not either unscientific, in the regular meaning of that word; it has nothing to do with science; it is non-scientific or extra-scientific. For **science deals, not with values, but with facts.** There is no good or bad, sick or well, useful or useless, in science. When the results of science are taken over into everyday life, they are transformed into values; the telegraph becomes a business necessity,

the telephone a household convenience, the motor-car a means of recreation; the physician works to cure, the educator to fit for citizenship, the social reformer to correct abuses. Science itself, however, works simply to ascertain the truth, to discover the fact. Mr. H. G. Wells complains in a recent novel that no sick soul could find help or relief in a modern text-book of psychology. Of course not! Psychology is the science of mind, not the source of mental comfort or improvement. A sick soul would not go, for that matter, to a text-book of theology; it would go to some proved and trusted friend, or to some wise and tender book written by one who had himself suffered. So a sick body would betake itself, not to the physiological laboratory, but to a physician's consulting room or to a hospital.

We live, again, in a world whose centre is ourself. This does not necessarily mean that we are all selfish; a life may be very unselfish. But whether we are selfish or unselfish, we live in a universe which revolves about the Me. Our self spreads and expands, to embrace our clothes and house and books, our family and relations, our professional competence and connection, our political and religious beliefs; we find ourselves in all these things, and they become a part of us. A famine in India is a real event and takes its place in the world only if we are made uncomfortable when we read of it, or are stirred to send in a contribution, or suspect mismanagement somewhere and think we could have done better. And this, once more, is the same thing as saying that our ordinary living is not scientific. For science, which deals with facts, is on that account imper-

sonal and disinterested. Men of science honour Darwin, because they are human beings and live, like everyone else, in a world of values; but these same men of science are ready at any moment to test and criticise Darwin's work with the utmost rigour; while any parts of the work that are solidly established pass without name into the structure of the science to which they belong. A text-book of chemistry is about as impersonal as anything can be, despite the fact that every observation it describes and every law it lays down was once somebody's personal observation or discovery, and so formed part of some self-centred universe. That personal interest is irrelevant to science. It is as irrelevant to psychology as to chemistry. The psychologist has a great deal to do with his own mind; but that is because his own mind is the most easily accessible part of his subject-matter; it is not in the least because the mind happens to be his own. He does not care as psychologist — though he may care very much as human being — whether his mind is superior and talented and broad and cultivated or is the reverse of all these things; for in the first place these adjectives are all adjectives of value, and he is in search of facts; and secondly they are words of personal or individual appraisement, and he is not concerned to praise or blame himself. Nor is he concerned to trace the motives or judge the character of other men. There is a common belief that the psychologist is an uncanny person to meet, because he is always studying human nature and is able to read thoughts. This belief belongs to the non-scientific world; those who

hold it fear that the psychologist will detect in them some pettiness or meanness of human nature, or will lay his finger on some unfounded enthusiasm or some unreasoned detraction that they wish to conceal. As well might they think that the physicist whom they ask to dinner will be occupied with the surface-tension of his soup or the insulating properties of his mashed potato.

If we trace the history of human thought, we find that *the scientific attitude, as we have here described it, has emerged very slowly from that mixed medley of superstition and knowledge and belief and practical interest for which we have no better name than* **common sense**. How common sense has been constituted, and how science has gradually worked its way to an independent position, — these are interesting questions; but it is plain that we cannot enter upon them in a primer of one special science. Some references for further reading will be given at the end of the chapter. Meanwhile, the important thing is to understand clearly the aims and limitations of science. Science aims at truth; it deals with facts, with the nature of things given, not with values or meanings or uses; and it deals with these materials impersonally and disinterestedly. The student of science who fails to grasp the scientific point of view will fail also to get the perspective of a scientific textbook; he will not see the wood for the trees; and he will be disappointed with what science has to offer him; he will want to know the use of all this knowledge, while science has no regard for use. **The laws of psychology may be put to very many uses**, in business, in education, in legal procedure, in medicine, in the ministrations of

religion; but such uses are, from the psychologist's point of view, by-products of his science; just as the nautical almanac is a by-product of astronomy, or the safety-match a by-product of chemistry, or the stamping-out of malaria a by-product of biology. These practical results may be immensely important for everyday life; but science, in its impersonal and disinterested search for facts, makes no difference between one fact and another.

§ 2. **The Subject-matter of Psychology.** — Psychology is the science of mind. What, then, is mind? Everybody knows that, you will say, just as everybody knows what is matter. Everybody knows, yes, in terms of common sense; but we have seen that common sense is not science. Besides, common sense is not articulate; it cannot readily express itself; and it is a little afraid of plain statements. Close this book, now, and write down what *you* take mind to be; give yourself plenty of time; when you have finished, go over what you have written, and ask yourself if you really know what all the words and phrases mean, if you can define them or stand an examination on them; the exercise will be worth while.

Open the book again! The exercise was worth while; but it was not quite fair. For the fact is that these great comprehensive words that we all use and all understand cannot be rigorously defined; they are too old; they have lived through too many changes; they have gathered about them too many conflicting associations. They pass muster in our everyday discourse

only because we take them for granted and do not scrutinise them too closely. The expert alone can say what common sense means by mind; and even the expert must speak in general terms, qualifying and with reservations.

It seems, however, that the prime factor in **the common-sense notion of mind** is the idea of activity. We ascribe to mind the same sort of voluntary and purposeful activity that we ascribe to our fellow-men; and we distinguish this activity from the blind necessity of cause and effect. We find ourselves, and those about us, deliberating, intending, resolving, planning, recalling, doubting; and we say that these and similar activities are activities of mind. We also find ourselves, and those about us, breathing, secreting, moving; but here we draw distinctions. Breathing, we say, is a physical affair, though we may hold the breath by an act of will. Secretion results from some physical or chemical cause; only if we cry for sorrow or sweat for fear is mind influencing body. Walking and blinking may be physical only; but if we turn our steps by intention into a certain path, or blink on purpose to clear our sight, the physical movements become subject to the action of mind.

So long as we stick to examples, all this seems straightforward; only it is not easy to decide whether mind is activity, or whether these various activities are activities of mind. On the whole, common sense leans to the latter view: the activities are manifestations of mind. Mind itself is then something immaterial, lying behind the manifestations. What sort of thing? Apparently,

another human being, **an inner man that dwells within the outer man**, an insubstantial mannikin living inside the head. Does that sound absurd? But it did not seem absurd just now to read that we ascribe to mind the same sort of voluntary and purposeful activity that we ascribe to our fellow-men; and how could we do that unless mind were something like a human being? This inner man appears, in fact, to be the mind of common sense; the inner man thinks, reflects, remembers, desires; he is influenced by the outer man, becoming gloomy and morose when his host cannot digest; and he influences the outer man, who sheds tears when his inmate is grieved. A curious view, when we write it out and think of it in cold logic; but a view that we should understand if we traced the growth of common sense from its first beginnings; and a view of highly respectable antiquity. Very ancient superstitions are connected with the man who is seen in the eye; the Egyptian *ka* or spirit-double is a smaller copy of the outer man; Greek vase-paintings show the human soul as a tiny human being; primitive thought has from time immemorial explained, and the modern savage still explains, the life and motion of man, or his repose in sleep and death, by the presence or absence of the little creature normally at work within him.

Yet however natural a view like this may be, science can make nothing of it. For one thing, it merely pushes the problem a step further back. The inner man acts on the outer man and is acted on by him; but who or what gives the inner man, in his turn, the power to influence and to be influenced? We must suppose

an endless nest of mannikins. That and other such arguments apart, however, the view is non-scientific because it offers an interpretation and not a description of mind. *The mind with which psychology deals must be a mind that is describable in terms of observed fact;* otherwise it cannot form the subject-matter of a science. So we must start afresh, and ask what mind is, when mind is looked at **from the scientific point of view.**

You will better understand the answer to this question when you have worked through the book. The answer will then have been given in the concrete and particular; now it can be given only in the abstract and general. Remember that it is given, nevertheless, in terms of work done and results obtained; it is not an answer that the psychologist makes up beforehand, but one that he himself has been led to in the course of his attempt to work scientifically upon mind. In brief it is this.

We find that the field of science has been surveyed from two different standpoints. Men of science have set out, on the one hand, to describe the world as it would be with man left out. The result is what we call physical science. The world of physics is colourless, toneless, neither cold nor warm; its spaces are always of the same extent, its times are always of the same duration, its mass is invariable; it would be just what it is now if mankind were swept from the face of the earth. For what is light in the text-books of physics? — a train of electromagnetic waves; and sound is a vibratory motion of air or water; and heat is a dance of molecules; and all these things are independent of man. But men of science have tried, on the other

hand, to describe **the world as it is in man's experience**, as it appears with man left in; and the result of this endeavour is psychology. The world of psychology contains looks and tones and feels; it is the world of dark and light, of noise and silence, of rough and smooth; its space is sometimes large and sometimes small, as everyone knows who in adult life has gone back to his childhood's home; its time is sometimes short and sometimes long; it has no invariables. It contains also the thoughts, emotions, memories, imaginations, volitions that you naturally ascribe to mind; it contains, that is, so much of these things as belongs to the sphere of observable fact. It is obviously very different from the world of physics, though both worlds alike have been opened up to us by science, by the impersonal and disinterested search for facts.

So we have a world of matter and a world of mind. The physicist, however, describes and measures the various phases of energy, without assuming any material substance in the background, any matter of which this energy is the manifestation. Matter, if the word is to be used at all, is simply the inclusive name for all the forms of energy. And the psychologist, in the same way, describes and measures — so far as he is able to measure — the phenomena of his world, without assuming any active or perduring mind in the background; for him, mind is simply the **inclusive name of all these phenomena**. That is the first rough answer to our question. Much more must be said, if the answer is to be precise; but even as it is we have travelled a long way from the little man living inside the head!

§ 3. **Mind and Body.** — The first thing to get clear about is the nature of the *man left in* the world, the man whose presence is necessary for psychology and unnecessary for physics. Since we are talking science, this man will be man as science views him, and not the man of common sense; he will be, that is, the organism known to biology as *homo sapiens*, and not the self-centred person whom we meet in the everyday world of values. But the human organism owes its organic character, the organisation of its parts into a single whole, to its *nervous system*. All over the body and all through the body are dotted sense-organs, which take up physical and chemical impressions from their surroundings; these impressions are transmitted along nerve-fibres to the brain; in the brain they are grouped, arranged, supplemented, arrested, modified in all sorts of ways; and finally, it may be after radical transformation in the brain, they issue along other nerve-fibres to the muscles and glands. The nervous system thus receives, elaborates, and emits. Moreover, there is strong evidence to show that **the world which psychology explores** depends for its existence upon the functioning of the nervous system; or, if we prefer a stricter formula, that this world **is correlated with the functioning of the nervous system.** The *man left in* thus reduces to a nervous system; and that is the truth of the statement, often met with in popular scientific writing, that the brain is the organ of mind. There is no organ of mind; that phrase is an echo of the old-world search after the place of residence of the mannikin-mind, which was assigned variously to heart, liver, eye, brain, blood, or

was supposed somehow to perfuse the whole body. The scientific fact is that, whenever we come upon mental phenomena, then we also find a functional nervous system; we know nothing of the former apart from the latter; the two orders are thus correlated.

The fact of this correlation has been established by two principal lines of evidence. In the first place, we find all through the animal kingdom that *size of brain and complexity of nervous system are matched by range and complexity of mental phenomena.* The brain of man is, by absolute measurement, an organ of great size; it is heavier than that of any other animal with the exception of a few of the very largest (such as the elephant); and in these cases the superior weight is due, not to superior development of the elaborating part of the brain, but to the bulk of the receiving and emitting portions, which are of a size to correspond with the bulk of the body. The brain of man is also relatively, as compared with the weight of the whole body, heavier than the brain of any other animal with the exception of a few of the most highly developed small mammals (such as certain monkeys); and in these cases again the superiority depends on the bulk of the receiving and emitting portions of the brain, which reflect the keen sensitivity and muscular agility of the animal. We know, on the other side, that the mental life of man is richer than that of any other creature. Secondly, we find that *disturbance of certain parts of the brain indicates a certain form of mental disturbance;* and, conversely, that particular forms of mental disturbance indicate disturbance of particular parts of the brain. One may become blind

from injury to the brain as well as from such defect of the eye as prevents optical impressions from reaching the brain.

These are the two lines of evidence. How, though, you may now ask, do we know anything about the distribution of mental phenomena in the animal kingdom? **How do we know that the lower animals live in mental worlds**? and still more how can we say anything as to the nature of the phenomena that make up those worlds?

Consider first *the case of your fellow-men*. You do not doubt that they have experiences like your own; you take them for granted, accept them instinctively as your kin, and are able — the better as you know them better — to put yourself in their place. If, however, you had to argue the matter with a sceptic, you would point to the facts of our common life. Man's family life, social life, civic life, national life, is based on the assumption that human experience is alike for everyone, and would be impossible if the assumption were falsified by the facts. All these forms of life, for instance, presuppose language and laws; and language and laws necessarily imply a community of experience. You would point, also, to likeness of physical organisation, likeness of sense-organs and nervous system; and you would point, lastly, to conduct or behaviour. When you feel in a certain way, you act in a certain way; your behaviour expresses your feeling; and when, under the same circumstances, a creature of like organisation regularly acts in the same way, you have a right to infer that this creature has a like feeling.

Now consider *the higher animals*. They possess a

physical organisation closely resembling that of man. They also behave in ways that appear to express feeling. If you were familiar only with their structure, with their sense-organs and nervous system, you would be ready to endow them with mind; if you knew them only by their behaviour, you would reach the same conclusion; since you may know both, and may therefore correlate physical structure with conduct, you are able to form a fairly accurate idea of their mental world. But *as you go down the scale of life, difficulties arise.* The nervous system changes its type, and presently disappears; and behaviour becomes equivocal, so that students of behaviour dispute whether it is still expressive or is purely mechanical. The controversy is even carried over from the animals to the plants; there are psychologists who seriously attribute a mental life to plants. Be that as it may, the important point for us is that, as the nervous system simplifies, so does all available evidence indicate that the world of mind simplifies with it; and if mind extends further down the line of life than the nervous system, we have merely to change the wording of our general statement; we must expand it, and say that, throughout the realm of life, size and complexity of the nervous system, or of that vital mechanism which precedes the nervous system and anticipates its functions, are matched by range and complexity of mental phenomena.

The *nature of these phenomena* cannot be set forth with any assurance. It is difficult enough to psychologise the life of the Australian Arunta, who is our fellow-man, or of the dog who has been our companion for half-a-

dozen years. What shall we say of the spider, or the amœba, or of sundew and eelgrass? All that we can do is to follow back the history of the sense-organs, from complex to simple, comparing as we go; and to observe how the organism behaves under given circumstances, comparing this behaviour with that of other organisms higher and lower in the scale, and bringing our comparison back again and again to its final term in our own experience. We lose a great deal when we lose the nervous system; but life, after all, is a continuous development; and the disappearance of this special structure, though it may mean that our statements become vaguer and less definite, need not make our general quest hopeless. Honesty of purpose, and a passion for knowledge, and sound scientific training will carry a man further, even in this dark continent, than the casual enquirer would deem possible.

§ 4. **The Problem of Psychology.** — The subject-matter of psychology, as we saw on p. 9, is the whole world as it shows itself to a scientific scrutiny with man left in. Or, to put the same thing in another way, psychology gives a scientific description of the whole range of human experience correlated with the function of the human nervous system. We have just learned, however, that there is a psychology of the lower animals, possibly even of plants; and we must therefore say that we were speaking in § 2 of the subject-matter of human psychology. This is the psychology that will occupy us in the present book. Let us now see what our actual task is. **What have we to do, in order to get a scientific description of mind?**

We must do what everybody does who begins to describe; we must take things piecemeal. When you are away at the seaside, and are describing your room in a letter home, you tell of exposure and windows and carpets and furniture and pictures; you break up the room into parts, and list them one by one; but you do not list at haphazard; you bring your items into such connection as will make it easy for your readers to reconstruct the room. The man of science does the same sort of thing; he analyses, and all the while he is analysing he has his eyes open for relations, for putting his elements together again as they belong. The chemist analyses water into oxygen and hydrogen, and acetic acid into carbon, oxygen, and hydrogen; and you see at once that this **analysis** is the first step toward a scientific description; for it reduces the compounds to their elementary components, and it shows that the two compounds have certain elements in common. But the chemist, almost in the same breath, is putting together again. The ordinary formulas for water and acetic acid, H_2O and $C_2H_4O_2$, indicate that; for they show the number of atoms of the various elements that are held in the compound. Chemistry also has graphic formulas, of a kind that look complicated to the outsider but that are really more instructive than the others, — formulas which show in what manner, under what laws, the atoms are bound together. Any good encyclopædia will give you samples.

The psychologist, now, stands before a like problem. The mental world, no less than the material, comes to us in the gross; mental phenomena are complex, often

highly complex; we must reduce them to their elements, we must keep analysing till we can analyse no further, if we are to describe them in a scientific way. And here too **synthesis** goes hand in hand with analysis. Psychology, to be sure, does not write graphic formulas; but psychology has to show how its elements go together, to discover the laws of their connection; we shall find that tones and colours go together in very different ways. All the while that we are tearing a bit of our world apart, and finding its elements, we are trying to put those elements back again in their places and to reconstruct the original experience.

Synthesis, unfortunately, is often very difficult; and you must notice that a *failure to reconstruct does not necessarily mean that the preceding analysis was wrong.* A chemist may analyse a given substance into a certain number of elements, each one represented by a certain number of atoms; yet if he puts these elements together again, in the right proportions, he may — perhaps because he is now working at a different temperature — come out with another substance of different properties. His analysis was not therefore wrong; but his attempt at synthesis is a failure because he has not taken account of all the relevant circumstances. It may happen similarly in psychology that we do not know all the relevant circumstances; or it may happen that we know them but cannot control them; in such cases we cannot reconstruct. The only thing to do is then to make analysis its own test; we analyse again and again; and if the result is always the same, we are satisfied to let it stand. Children who do not know how to prove

an example in arithmetic follow the same plan; if they get the same answer several times over, and if their schoolmate gets that answer too, they are satisfied; and when the work has been honestly done, the agreement is pretty good evidence that they are right.

Notice one other point: that if you sit down to describe, there is simply no escape from analysis. *To begin a description is to be analysing.* Well-meaning people sometimes shake their heads at scientific psychology; all this dissecting work, they say, misses the real issue; it kills mind; it destroys the living, breathing reality of experience, and offers in its place a catalogue of dead facts. The mannikin again! Of course, if mind is a little man inside you, you must kill him to dissect him, — though he nevertheless crops up again, alive and well, after the autopsy. The mannikin, as we have seen, cannot face cold logic. No, the task of science is to describe; if you are to describe you must analyse; and the results are every bit as real as the unanalysed experience. Dead facts? But a fact is the most live thing possible; it will survive any number of theories, and will still give birth to more.

Lastly, since mental phenomena are **correlated with the function of the nervous system**, the psychologist's task is not complete until he has acquainted himself with the physiology of that system, and has worked out the correlation as accurately as is possible. Here, again, is something that you will better understand when you have read further in the book. For the present we will notice two points. First, the psychologist can gain access to a large part of his world only by way of

the organs of sense; and it is therefore important that he know the structure and functions of these organs and their relation to the brain. Secondly, a train of mental phenomena may be guided and directed by events, occurring within the nervous system, which themselves have no counterpart in the world of mind; for, while all mental phenomena are correlated with processes in the nervous system, not all processes in the nervous system have mental phenomena to correspond with them. Unless, then, the psychologist knows the nature of these guiding events, he will be like the chemist who failed to take account of temperature; he will lack knowledge of relevant circumstances. Special books upon the nervous system have been written, giving in outline what the student of psychology needs to know; some of them are referred to at the end of the chapter; but it is an advantage to have taken a practical course in the physiology of the nervous system, and to be able to think in terms of neural processes. If you have had no such opportunity you can still learn a good deal from diagrams and verbal accounts; and you may find comfort in the assurance that there have been eminent psychologists who knew very little about the brain.

In fine, then, the problem of human psychology is threefold: to analyse mental phenomena into their elements, to discover the laws of mental connection, and to work out in detail and under all its phases the correlation of mind with nervous system.

§ 5. **The Method of Psychology.** — Having learned what we have to do, let us ask what method we are to

follow in doing it. So far as the nervous system is concerned, it is evident that the psychologist must take his cue from the physiologist; indeed, this part of his problem makes him, for the time being, a physiologist, only that his real interest remains centred in mind. But how is it when he is attacking the other parts of the problem? Is there a special psychological method, a peculiar way of working, that he must adopt in his study of mental phenomena? The answer is No: his **method is that of science in general.**

This method may be summed up in a single word as **observation.** All scientific description, all description that reflects a disinterested and impersonal search for fact, is got by way of observation. And observation implies three things: a certain attitude towards phenomena, a vivid experience of the particular phenomenon which is the object of observation, and an adequate report of this experience in words. The relation of these three things will be clear if we write a formula for observation, thus:

psychological (vivid experience ⟶ full report).

The adjective outside the bracket shows that we take up a psychological attitude to the world; in other words, that the world which we are exploring is (to use our catchphrase again) the world with *man left in.* The adjective applies to the whole contents of the bracket; the experience which we are to have is mental experience, and our account of it is to be couched in psychological language. We are, then, ready for the experience; it comes, and we give it our best attention; we then express it in

words; and we try to express it fully and adequately, in the words that it itself points to and requires. When the account has been written down, and so made available for other students, we have completed a psychological observation. When a number of such observations have been taken, we have the materials for a scientific description.

Observation is by no means easy; "there is not one person in a hundred," said Huxley, "who can describe the commonest occurrence with even an approach to accuracy." The reasons are partly of a technical nature; the use of scientific method is a bit of skilled labour, and skilled labour presupposes training; at first we are likely to be careless and clumsy; we do not see the need of scrupulous care, just because we do not know exactly what it is that we are doing. The great reason lies, however, in that difference between science and common sense to which we have already adverted; common sense interprets, and science describes. Mal-observation is due, in the great majority of cases, to the ingrained tendency of the onlooker to interpret, to explain, what he observes. How many educated men and women to-day believe that the full moon dissipates the clouds? and how many more believe that changes of the moon coincide in some way with changes of the weather?

These remarks apply very definitely to psychology. *The psychological observer needs technical training, first and foremost, because mental phenomena never stand still to be observed;* mind is always in course, always going on; he must learn either to take rapid notes as the experience is passing, while he still remains alert to the

new phases as they come, or he must register the experience phase by phase in memory, and reproduce it in words after it has passed. Nothing could well be more misleading, as a name for mental phenomena, than the familiar phrase 'states of consciousness'; for a state is something relatively stable and permanent. Mental experiences are moving, proceeding, ongoing experiences; we might make up one of Lewis Carroll's portmanteau-words, and say that their essence is a processence. We shall henceforth speak of them as **mental processes**; only remember that they are not processes of something or in something, like the processes of decomposition and fermentation; they are experiences whose very nature is a proceeding, a course in time.

Secondly, *the psychological observer is badly handicapped by common sense*, which has long drawn a distinction between the method of psychology and the method of physics. Psychology is supposed to look within, to turn its eyes inward; physics is supposed to look out upon the objective world, and to keep its eyes in their normal position. The method of psychology is then an introspection or self-contemplation, a looking-in; and the method of the physical sciences is an inspection, a looking-at. The self which is thus introspected is, of course, judged and valued and approved and blamed; we know the ear-marks of common sense. So we find that the hero of yesterday's novel "was not given to introspection. His external interests in life were too engrossing for him to think deeply or continuously about himself. Such a habit of mind he used vehemently to deprecate as morbid, egotistical. But

now"— now the fateful girl is on the scene; the hero begins to think about himself; and flatters himself, poor man, that he is turning psychologist.

Unfortunately, neither a keen appreciation of his own virtue nor a rooted distrust of his own powers makes a man into a psychologist. Science turns its back upon the world of values. If, then, we are to keep the word **introspection** for the method of psychology, we must write the equations:

introspection = psychological (vivid experience ⟶ full report)

inspection = physical (vivid experience ⟶ full report)

where the adjectives outside the brackets mean simply what we have already stated them to mean. When once the initial attitude has been taken, and the world to be explored has thus been determined, the methods are the same. The beginner in psychology will however find, again and again, that his common-sense self stands in the way of disinterested observation; and as the word introspection contains a reference to this self, he may prefer to drop it altogether.

So much for observation in general! When we come to particulars, we find that science, wherever possible, has recourse to **experiment**. This does not mean that science renounces observation. For an experiment, if we push our definition back to fundamentals, is simply *an observation that may be repeated, that may be isolated, and that may be varied.* See the advantages! Repetition gives us plenty of time for observation; we need

not mind overlooking something now, since we shall have the opportunity of picking it up later; and we can go on, observing and observing, until our description of the phenomenon is as complete as it can be made. Isolation makes our task easier; disturbing influences are ruled out; our attention is not distracted; we can give ourselves wholly to the matter in hand. Variation — the substituting of one factor for another in successive observations, or the emphasising in one observation of a factor that was obscure in another — helps us to clear up doubtful points; to distinguish what is universal from what is only accidental in the phenomenon we are observing; and to bring this phenomenon into relation with kindred phenomena. *Repetition saves hurry and worry; isolation prevents distraction; variation keeps us from jumping at conclusions.* These are the advantages of experiment; and all experiments, in physics, in chemistry, in biology, everywhere, fall under this definition.

Psychology needs the experimental method for both the reasons noted above: because the observed phenomena are elusive and slippery processes, and because the observer is warped and biassed by common sense. We may therefore show by an example *how psychological experiment is possible.* Suppose that we wish to find out how a printed word is perceived, — whether we read it letter by letter, or take in its form as a whole, or take in certain letters clearly and the general form vaguely. We first prepare our material. We print upon cards, or photograph upon lantern slides, a large number of words. We employ different printing types;

different groups of letters; different lengths of words; single words and groups of words; words properly spelled, and words altered by mutilation or omission of particular letters at different parts of the word. Every one of these classes of stimuli, as the words may be technically called, is represented by a number of cards or slides. The stimuli are mixed in haphazard order, and are thrown upon the screen by a reflectoscope or projection lantern in an otherwise dark room; a pneumatic shutter before the lantern makes it possible to show them for a brief time, say, a fifth of a second. All this apparatus is put in the charge of an experimenter. When the material is ready, and the whole arrangement works properly, an observer is called in. He works for a limited time, at the same hour every day, and only after a certain time has been allowed for his eyes to accustom themselves to the dark. The stimuli are presented at regular intervals. The observer reports what he perceives at every exposure of a stimulus, and the experimenter writes down what he says.

It is plain, now, that these observations may be repeated. For one thing, there is a group of like cards in every class; and for another thing, the observer himself (since he works every day at the same time and under the same circumstances) is a fairly constant quantity. Besides, the observations may also be made by other observers, in other laboratories, under precisely the same circumstances; they may be repeated in just the same sense that a physical observation may be repeated. Secondly, the observations are isolated; they are made in a dark and quiet room, free from

outside disturbance. No doubt, the observer's thoughts may wander in the intervals between observations. For this reason, the experimenter gives a preconcerted signal, or calls out *Now*, a second or two before a word is shown; this signal warns the observer to pull himself together and to free himself from any such distractions. Thirdly, the observations are varied; for we employ all sorts of words, both normally printed and variously changed; and the stimuli may be presented for various lengths of time. Here, then, is a true psychological experiment; and if many observers, after many observations, give the same account of their perceptive experience, that account may stand as established psychological fact.

Not all mental phenomena can be subjected to experiment so neatly as this particular perception; and the psychologist must still fall back, more often than he likes, upon casual observation or imperfect experiments. The reason is that *psychology has only recently become an experimental science.* Common-sense psychology is very old: we have a complete treatise in Greek from the hand of Aristotle, and a text-book in Pali compiled by some Buddhist sage, both dating from the fourth century B.C. But while it is in the sixteenth century of our era that the physicist abandons scholastic speculation and begins to study nature by experiment, it is not till the last quarter of the nineteenth that the psychologist follows suit. In or about the year 1875 the late Professor James, then instructor in anatomy and physiology at Harvard, had a single room devoted to psychological apparatus and experiments; and in 1879

Professor Wundt opened at the University of Leipsic, in a very modest way, the laboratory which has since become the most famous in the world. It is true that experiments in psychology had been made by individuals long before laboratories were thought of; but the same thing is true of physics and chemistry; and we may remember, when we come to the weak places of psychological exposition, that laboratory research and instruction are not yet fifty years old.

§ 6. **Process and Meaning.** — Science, we said on p. 4, does not deal with values or meanings or uses, but only with facts; and we have just seen how words, which in everyday life are practically all meaning, may be made the objects of psychological experiment. Still, in their case, after all, we were simply ignoring meaning; so far as the observer was able to read words at all from the stimuli flashed on the screen, he read words which had a meaning, and a meaning that the experimenter might have discovered if he had been interested in it. We have not offered any evidence that **mental processes are not intrinsically meaningful**, that meaning is not an essential aspect of their nature; we have just assumed that they may be treated, scientifically, as bare facts. Let us now see whether meaning is essential to them or not. There are several heads of evidence.

First, *meaning may be stripped from the mental process* to which it normally belongs. Repeat aloud some word — the first that occurs to you; *house*, for instance — over and over again; presently the sound of the word

becomes meaningless and blank; you are puzzled and a morsel frightened as you hear it. The same loss of meaning is observed in pathological cases; there are patients who can hear and see words as plainly as you can, but who are unable to understand what they hear and see; the bare perception is there, but it is bereft of its meaning.

Secondly, a *meaningless experience may take on a meaning*. A friend shows you a card, upon which is scrawled a tangle of lines; you cannot make head or tail of it. He tells you to look at the back; you see the date there written; you think at once of a great earthquake; you realise that the scrawl is a seismographic record. Meaning has thus been attached or added to a bare perception. Similarly, in learning a new script or a new language, you attach meaning to what was at first meaningless. The first experiments in the teaching of the blind deaf-mute Laura Bridgman " were made by pasting upon several common articles, such as keys, spoon, knives, and the like, little paper labels on which the name of the article had been printed in raised letters." These meaningless feels, as they were at the outset, came presently to mean the objects with which the teacher had connected them.

Thirdly, *an experience and its meaning may be disjoined in time*. We often ask, in conversation, to have a remark repeated; we have heard without understanding; but before the speaker has time to repeat, we ourselves begin to reply; the meaning has come, but comes after an appreciable interval. So we may have to wait a little while before we can recall the meaning

of some foreign word that nevertheless, as we say, we know perfectly well. This disjunction is also found in pathological cases. A patient " with slight stupor could not answer questions except very slowly. She was constantly saying: ' I see everything, but I don't know anything.' It took her five minutes to tell the time when she was shown a clock."

Here the experience comes first, and the meaning follows after. This order may, however, be reversed. You want to know the German of the proverb ' Out of the frying pan into the fire '; you have the meaning, but you cannot think of the words; and presently the words leap to mind, *aus dem Regen in die Traufe*, out of the rain into the roof-drip. Or you know what you want to say, but you cannot get this meaning into words. An author who is very definitely aware of the meaning he wishes to convey to his reader may nevertheless have to write a paragraph ten or twenty times over before the sight and sound of his own words give back that meaning to himself. Or again, you may anticipate, in listening to a lecture, the meaning of what the lecturer is going to say, and yet you may be surprised at the words which he actually uses.

Fourthly, *one and the same experience may have several meanings*. Any dictionary is a proof of that! A lecturer may demonstrate the fact to a class by drawing on the blackboard, line by line, the figure of some such thing as, for instance, a desk-telephone. As the drawing proceeds, the lines may mean a pump, or a student lamp, or an electric portable, or a railway semaphore, or a jack, or various other things. In this case, to

be sure, a single meaning is given when the drawing is complete; but there are plenty of experiences — a bit of bad handwriting, a distant object, an obscure patch in a painting — that leave us permanently unable to decide among several meanings. How often do we worry over a chance remark: it seemed to mean this, but could it have meant that, or is it possible that it really meant the other?

Fifthly, *one and the same meaning may attach to several experiences*. You walk into a room, and there see a table; you go into the same room in the dark and hurt yourself, and you complain that you ran against the table; you hear a noise overhead, and wish that the maid would not drag that table about. Here the meaning of a particular table is carried by three modes of perceptive experience. In certain forms of mental disorder one obsessing meaning colours all the experiences of the daily life. The patient "scents poison and treachery on all sides. He has slowly convinced himself by numerous tests in little things that he is no longer liked. The workmen are refractory and disobedient with him more than with anyone else. His chiefs and his fellows play malicious tricks upon him. His food tastes differently, and does not agree with him. When he goes to another town, it is plain that his enemies have anticipated him by writing letters to his injury." Every experience that this man has means persecution.

Sixthly, *meaning and mental process are not covariants*. Richness and fullness of experience do not necessarily correspond with wealth of meaning; you may, in fact, be bewildered, and fail to find a meaning just because

there is so much material to take in; your first hearing of a Wagner opera gave you, probably, more sound than sense. Conversely, poverty of experience does not necessarily mean loss or reduction of meaning; if that were the case, we could not pack so much meaning into such little things as words.

All this evidence would be greatly strengthened if we went beyond the limits of individual experience, and compared man with man, profession with profession, race with race, age with age. What is meaningless to me might be full of meaning to you; the same landscape yields different meanings to the geologist and the farmer; a protruded tongue means insult here, but politeness in Thibet; the art of the telegrapher would have spelled black magic a few centuries ago. Enough has perhaps been said to give plausibility, at any rate, to the statement that **mental processes do not intrinsically mean**, that meaning is not a constituent part of their nature; and that may suffice for the present; we shall come back again to meaning later. Value and use need hardly be discussed; they are, far more clearly than meaning, additional to (and detachable from) experience. If, however, the reader thinks that the point should be worked out in their case also, he may put them through the same sort of examination as that to which we have just subjected meaning; evidence will at once be forthcoming.

§ 7. **The Scope of Psychology.** — Science, like the Elephant's Child in the story, is full of an insatiable curiosity. Just as the physicist reaches out, analysing

and measuring, to the farthest limits of the stellar universe, so does the psychologist seek to explore every nook and corner of the world of mind; nay more, he will follow after a mere suspicion of mind; we have seen him trying to psychologise the plants. The result is a vast number of books and monographs and articles on psychology, written by men and women of very different interests, knowledge and training; for science does not advance on an ordered front, but still depends largely on individual initiative. A high authority on the Middle Ages has said that one mortal life would hardly suffice for the reading of a moderate part of mediæval Latin; and the psychologist must recognise, whether with pride or with despair, that one lifetime is hardly enough for the mastery of even a single limited field of psychology. The student has to get clear on general principles, and then to resign himself to work intensively upon some special aspect of the subject-matter, — keeping as closely as he may in touch with his fellow-workers, and aiming to see his own labours in a just perspective, but realising that psychology as a whole is beyond his individual compass.

Does that sound exaggerated? Let us then attempt a rough classification! We begin with the **psychology of the normal mind**. Under this heading we have to distinguish (1) *human* psychology. Human psychology may be *general*, the psychology of the adult civilised man, which forms the principal topic of the textbooks of psychology; *special*, the psychology of the human mind at some other stage of individual development: infancy, childhood, adolescence, senility; *dif-*

ferential, the study of the differences between individual minds; or *genetic*, the study of the development of mind from childhood to manhood, and its gradual decay in old age. (2) *Animal* psychology may be subdivided, in the same way, into general, special, differential and genetic psychology. (3) *Plant* psychology is still in its first beginnings; but many students are taking the subject seriously. (4) *Comparative* psychology is the comparative study, either of various types of animal mind, or of the minds of plants, animals and man. It, again, may be general, special or genetic.

All these psychologies deal with the *individual* mind. There is also a *collective* psychology; and, though its divisions are not yet sharply marked off from one another, we may distinguish (5) *social* psychology, which includes the study of what is called the social consciousness, and also the scientific study of the products of the collective mind: language, law and custom, myth and religion; (6) *ethnic* psychology, the differential psychology of nations or races; and (7) *class* psychology, the differential psychology of classes or professions.

Turn now to the **psychology of the abnormal mind**. Here we find, under the heading of *individual* psychology, (8) the psychology of *deficient and exceptional minds;* of blind deaf-mutism, of genius, of the subnormal and the supernormal child; (9) the psychology of *temporary mental derangement;* of dream, of hypnosis, of intoxications, of occasional hallucination and illusion; and (10) the psychology of *permanent mental disorder*, of the chronic derangements of insanity. We may also

study (11) the psychology of *temporary derangement* of the *collective* mind, that is, of the manias or mental epidemics that sometimes sweep society: the mediæval dance-manias, unmotived panics, outbursts of superstition, of religious persecution.

If we proceed further, from psychology proper to **psychotechnics**, or to what is ordinarily termed applied psychology, we have the great departments of (12) *educational* psychology, (13) *medical* psychology or psychotherapeutics, (14) *juristic* psychology, or the psychology of evidence and testimony, and (15) *economic* psychology, which includes such things as vocational psychology and the psychology of advertising.

You need not ascribe any special importance to this classification; still less need you memorise it. The various topics might very likely be better arranged, and the list is by no means complete. Realise, however, that every term in the list has its text-books and treatises, its manuals and monographs, and very likely its magazine or magazines; realise again that, although the emphasis varies in the different countries, the list might be filled out not alone in English, but in all the chief European tongues; and remember, lastly, that some of the headings have a very long history, and a correspondingly long series of printed works over and above those that represent current knowledge. You then get a glimmering of **the range and scope of psychology**. It is true, of course, that much of what has been printed is out of date, or inaccurate, or superficial, or prejudiced, and for these or like reasons may safely be scrapped. Yet it all has to be sifted.

The mere bulk of psychological material would be less formidable if every writer adopted the same principles and wrote from the same point of view; but that is hardly to be expected. Psychology has always been exposed to the infection of common sense; it has only recently turned to scientific methods; and when the time came for it to take its place among the sciences, there was naturally difference of opinion regarding the standpoint it should assume, the procedure it should follow, the model it should seek to copy. Where such differences of opinion obtain, the best way to begin your study is to **master one system thoroughly**; your ideas are thus made consistent and your knowledge receives an orderly arrangement; then, as you read further, you can use this system as a touch-stone whereby to test new ideas and to arrange new knowledge; and if the new ideas seem preferable to the old, or if the old framework breaks down under the new knowledge, you can alter your own system accordingly. If you begin, on the contrary, by studying a number of works abreast, you are liable to become confused. And it is better to be wrong than to be muddled; for truth, as Bacon said, emerges more quickly from error than from confusion.

§ 8. **A Personal Word to the Reader.** — These introductory sections are not easy. The only way to make them easy would be, as an Irishman might say, to leave the difficult things out; but then you would come to the later chapters, where we study mental phenomena in the concrete, with all sorts of prepossessions and misunderstandings; psychology would be one long diffi-

culty instead of being, as it henceforth ought to be, a bit of straight sailing.

So you must face the initial difficulty and overcome it. Indeed, **you must do more than merely understand.** The author's undergraduates who break down in a preliminary examination always explain that they followed the lectures perfectly, and thought they understood the text-book, but that they were somehow unable to put things properly in their own words. The author's small daughter who comes home with an elaborate example in compound interest explains, in the same manner, that she thoroughly understood the rule when She explained it, but that she can't now see just how to go to work for herself. It may be that these excuses are not wholly reliable; they bear, at any rate, upon the present point. You must not only understand what you read as you read it; you must exercise your thought upon what you have read; you must be able to explain the paragraphs, in your own words, to others; you must find instances and illustrations for yourself; you must make the substance of the paragraphs a part of your habitual mental furniture; you must note how the old ways of thinking crop up to mislead you, and must correct and criticise the natural man. In a word, just as you practise your way into a language by reading, translating, writing, speaking; or just as you practise your way into algebra by doing exercise after exercise until the rule seems to be part of you and applies itself of its own accord; so must you **keep practising your psychology** until it becomes instinctive. You will gain some help by answering the appended ques-

tions; but after the book has done all that it can for you, the real induction into psychology remains to do for yourself.

Some of the questions are concerned with forms of expression; and you should take these very seriously, since *language will be one of your greatest stumbling-blocks*. Language is older than science, and has developed under pressure of practical needs. Hence the phrases that come most naturally to your lips may embody a view of the world, or an attitude toward experience, that is totally foreign to the scientific context. If a visitor from Mars heard us all talking about the sunset, what would he think of our knowledge of the heavenly bodies? Yet we cannot escape from language; and if Newton could express his ideas in Latin, we ought to be able to express ours in English. It is a good plan, at the start, to have your technical definitions always at hand, and to try the effect of substituting these definitions for the words that you have been using; if the resulting clumsiness makes sense, you may let your first expressions pass; but if not, you should try again.

You will notice, as you read on in the book, that back references become numerous. Be advised to look these references up! They send you, in every case, to a particular page, so that their finding is easy, and you can refresh your memory without any great loss of time; though, for that matter, it will do no harm to glance over the section in which they occur. If you, on your part, want to refer to some past discussion, consult the index; it has been made fairly full, and is meant to be used.

Questions and Exercises

Many of the books to which you will be referred, now and later, have appeared in numerous editions, library and popular, English and American. The references are made so complete that you will easily find the corresponding passages in editions other than those used by the author.

(1) Discuss the following definitions of science. If you have access to the books, read the passages in which the definitions occur; if not, do the best you can with your present knowledge. Try to see a reason even for the definitions that you cannot accept.

(*a*) Science is perfected common sense (Huxley). The definition accords with the view of Spencer that science and ordinary knowledge are allied in nature, and that the one is but a perfected and extended form of the other. What is there in the common interests of these two men, or in the period in which they lived, to account for such a definition?

(*b*) Reduced to its lowest terms, science is the observation of phenomena and the colligation of the results of observation into groups (Hill).

(*c*) When may any subject be said to enter the scientific stage? I suppose when the facts of it begin to resolve themselves into groups; when phenomena are no longer isolated experiences, but appear in connection and order; when, after certain antecedents, certain consequents are uniformly seen to follow; when facts enough have been collected to furnish a basis for conjectural explanation, and when conjectures have so far ceased to be utterly vague, that it is possible in some degree to foresee the future by the help of them (Froude).

(*d*) Mechanics is the science of motion; and its problem is to describe the motions that occur in nature *completely* and *in the simplest way* (Kirchhoff). Can this definition of mechanics be generalised, so that it applies to science at large?

T. H. Huxley, Science Primers: Introductory, 1880, 18 f.; H. Spencer, The Genesis of Science, in Essays, ii., 1891, 8; A. Hill, Introduction to Science, 1900, 3; J. A. Froude, The Science of History, in Short Studies on Great Subjects, First Series, i., 1901, 13 f.; G. R. Kirchhoff, Vorlesungen über mathematische Physik: Mechanik, 1883, 1.

(2) Helmholtz tells us that whoever, in the pursuit of science, seeks after immediately practical utility, may generally rest assured that he will seek in vain; and Clifford asserts that the most useful parts of science have been investigated for the sake of truth, and not for their usefulness. Yet Pearson holds that one of the claims of science to our support is the increased comfort that it adds to practical life. How do you reconcile these statements?

H. von Helmholtz, On the Relation of Natural Science to General Science, in Popular Lectures on Scientific Subjects, i., 1904, 25; W. K. Clifford, On Some of the Conditions of Mental Development, in Lectures and Essays, i., 1879, 104; K. Pearson, The Grammar of Science, ch. i., 1900, 29 f., 37.

(3) Discuss the following definitions of psychology:

(*a*) The science which describes and explains the phenomena of consciousness, as such (Ladd).

(*b*) The science of behaviour (Pillsbury).

(*c*) The science of individual experience (Ward).

(*d*) The positive science of mental process (Stout).

G. T. Ladd, Psychology, Descriptive and Explanatory, 1894, 1; W. B. Pillsbury, The Essentials of Psychology, 1911, 5; J. Ward, Psychology, in Encyclopædia Britannica, xxii., 1911, 548; G. F. Stout, Analytic Psychology, i., 1896, 1.

(4) Can you bring the following series of statements into relation, and show that they illustrate natural (even necessary) stages in the history of human thought? (Note the phrasing in every case!)

(*a*) The savage thinker seems to have taken for granted, as a matter of course, the ordinary operations of his own mind.

It hardly occurred to him to think about the machinery of thinking (Tylor).

(*b*) The modern mind is, what the ancient mind was not, brooding and self-conscious; and its meditative self-consciousness has discovered depths in the human soul which the Greeks and Romans did not dream of, and would not have understood (Mill).

(*c*) When to save his own soul became man's first business, he must needs know that soul, must study, must examine it. Prescribed as a duty, introspection became at once a main characteristic of religious life (Burr).

(*d*) There is nothing more interesting to the ordinary individual than the workings of his own mind. This interest alone would justify the existence of the science [of psychology] (Pillsbury).

(*e*) If we could say in English 'it thinks', as we say 'it rains' or 'it blows', we should be stating the fact most simply and with the minimum of assumption (James).

E. B. Tylor, Animism, in Primitive Culture, i., 1891, 497; W. Knight, Rectorial Addresses delivered at the University of St. Andrews, 1863–1893: J. S. Mill, 1894, 38; A. R. Burr, Religious Confession and Confessants, 1914, 86; W. B. Pillsbury, *op. cit.*, 5; W. James, The Principles of Psychology, i., 1890, 224 f.

(5) What is the earliest notion of your own mind that you can recall?

(6) Four newspapers describe the same gown as gold brocade, white silk, light mauve, and sea-green with cream or ivory sheen on it. How could this difference of report have arisen?

(7) Newton is said to have discovered the law of gravitation by observing the fall of an apple from a bough. Was this a simple observation, or could it be said to have anything of the experiment about it?

(8) What are the characteristics of a good observer? of a good experimenter?

(9) The older psychologies speak, in technical terms, not of mental processes but of powers, faculties, capacities of the mind. What view of mind do these expressions imply?

(10) Rousseau remarked that definitions would be all very well if we did not use words to make them; *les définitions pourraient être bonnes si l'on n'employait pas des mots pour les faire* (Œuvres complètes de J. J. Rousseau: Émile, tome i., 1823, livre ii., 160). Illustrate this remark by reference to psychology.

(11) Try to describe your experience on some occasion which leads you to say: (*a*) I have made up my mind; (*b*) I have half a mind to do so-and-so; (*c*) That puts me in mind of so-and-so. Try to get down to the bare facts; it will be difficult; but try again and again, and do not be satisfied to report meanings.

(12) Describe your fountain-pen from the points of view of common sense, of physics, and of psychology. Do not attempt too much detail, but get the differences in point of view clearly on paper.

References for Further Reading

§ 1. Some general references have already been given; add W. Whewell, History of the Inductive Sciences, 3d ed., 1857. The book is out of date, but still useful. For science in the Middle Ages, see H. O. Taylor, The Mediæval Mind, 2d ed., 1914 (references in index). For the genesis of science, consult Tylor, as cited above; J. G. Frazer, Balder the Beautiful, 1913, 304 ff.; all the volumes of The Golden Bough are instructive. For an object-lesson in scientific thinking take H. Spencer, The Study of Sociology, 9th ed., 1880 (also no. 5 of International Scientific Series).

§ 2. Tylor, as above; J. G. Frazer, Taboo and the Perils of the Soul, 1911, 26 ff.; E. B. Titchener, Psychology:

Science or Technology? in Popular Science Monthly, lxxxiv., 1914, 39 ff.; J. Ward, Psychology, in Encyclopædia Britannica, xxii., 1911, 547 f.

§ 3. W. McDougall, Physiological Psychology, 1905; W. Wundt, Principles of Physiological Psychology, i., 1904, 1 ff., 27 ff., 280 ff.; R. M. Yerkes, Animal Psychology and Criteria of the Psychic, in Journal of Philosophy, Psychology, and Scientific Methods, ii., 1905, 141 ff.; M. F. Washburn, The Animal Mind, 1908; A. W. Yerkes, Mind in Plants, in The Atlantic Monthly, Novr. 1914, 634 ff.; J. B. Watson, Behaviour, An Introduction to Comparative Psychology, 1914.

§ 4. O. Kuelpe, Introduction to Philosophy, 1897, 55 ff.; Wundt, as above; G. T. Ladd and R. S. Woodworth, Elements of Physiological Psychology, 1911; E. W. Fiske, An Elementary Study of the Brain, 1913; K. Dunlap, An Outline of Psychobiology, 1914.

§ 5. W. S. Jevons, The Principles of Science, 1900, bk. iv., chs. xviii., xix.; E. B. Titchener, Prolegomena to a Study of Introspection, in American Journal of Psychology, xxiii., 1912, 427 ff.; O. Kuelpe, Outlines of Psychology, 1909, § 2; W. A. Hammond, Aristotle's Psychology, 1902; C. A. F. Rhys Davids, A Buddhist Manual of Psychological Ethics, 1900.

§ 6. M. Howe and F. H. Hall, Laura Bridgman, 1903, 49 f.; G. Stoerring, Mental Pathology in its Relation to Normal Psychology, 1907 (the quotations from this work are sometimes condensed in the text); S. I. Franz, Handbook of Mental Examination Methods, 1912, 68, 80.

§ 7. Add, as typical, to works already cited: W. Preyer, The Mind of the Child, 1888–9 (human special); J. M. Baldwin, Mental Development in the Child and the Race, 1906 (human genetic); *id.*, Social and Ethical Interpretations in Mental Development, 1906 (social); G. Le Bon, The Psychology of Peoples, 1898 (ethnic); A. Moll, Hypnotism, 1891 (derangement); G. Le Bon, The Crowd, 1910; J. Jastrow,

Fact and Fable in Psychology, 1900 (collective derangement); E. L. Thorndike, The Principles of Teaching Based on Psychology, 1906; H. Münsterberg, Psychology, General and Applied, 1914. For the history of psychology, see O. Klemm, A History of Psychology, 1914; M. Dessoir, Outlines of the History of Psychology, 1912.

CHAPTER II

Sensation

Now that these points have been determined, let us proceed to a general discussion of the whole subject of Sensation. — Aristotle

§ 9. **Sensations from the Skin.** — The skin is part of our organic birthright. One of the great differences between the living and the not-living lies in the possession of a skin; stone and iron weather and rust, but even the naked amœba has its ectosarc, and flowers of tan their plasmoderm. The skin is also the oldest of the sense-organs, and the mother of all the rest; how old, we dare hardly guess; but we know that the chemical elements which make up living tissue took form early in the history of our planet, earlier than the heavy metals. So it is natural to begin our survey of sensations by questioning the skin.

The skin is a shifty witness; and to get positive answers, we must literally cross-examine it; we must go over its surface point by point and line by line, with all sorts of mechanical and thermal and electrical and chemical stimuli. The outcome is a little surprising; we find only **four sensations, pressure, cold, warmth and pain.** The organs of these sensations are dotted in a sort of irregular mosaic all over the skin, and the intervening spaces are insensitive. The organs of pressure, distributed over about 95 % of the bodily surface,

are nerve-skeins twined about the roots of the hairs; on the hairless areas of the body, we find the nerve-skein by itself. The organ of pain is probably a little brush-like bunch of nerve-fibrils just below the epidermis. The organs of warmth and cold are certainly distinct; the sensations are not degrees of one sensation, as the thermometer might lead us to suppose; but the precise nature of their nerve-endings has not yet been made out.

You may easily find pressure spots by fastening a short horsehair with sealing-wax at right angles to the end of a match, and applying the horsehair point to the back of the hand above a hair-bulb, that is, just to windward of the issuing hair; dot the horsehair about, here and there, till the sensation flashes up. You may find cold spots by passing the blunt point of a lead pencil slowly across the closed eyelid. Warm spots are more difficult to demonstrate. For pain, take the shaft of a pin loosely between finger and thumb of the right hand, and bring the point down sharply on the back of the left hand; you get two sensations; the first is a pressure, the second — which pricks or stings — is a pain.

As a rule, these organs are not stimulated separately but in groups. Itch, for instance, is due to the light stimulation of a field of pain-endings, and superficial tickle to that of a field of pressure-organs. The experience of **heat**, curiously enough, is a blend of warmth and cold; there are no heat spots. It may be observed in this way: if you apply a surface of increasing warmth to a region of the skin which has both cold and warm spots, you feel for some time only the warmth; but

when the stimulus has reached a certain temperature, the cold spots, suddenly and paradoxically, flash out their sensations of cold; and the blend of warmth and of paradoxical cold is felt as heat. Cement a smooth copper coin to a handle, and apply it at gradually increasing temperature to the middle of the forehead just under the hair; you will presently find the heat. Or if you cannot do that, note the shiver of cold when you next step into an overhot bath.

When we compare these results with the show that the skin makes as a sense-organ in everyday life, we can hardly help bringing against it the charge of dishonesty. The pressure spots give us tickle, contact or light pressure, and pressure proper; the pain spots, itch, prick or sting, and pain proper. The cold spots give cold and cool, the warm spots lukewarm and warm; cold and warm spots together give heat; cold and pain give biting cold; cold and warm and pain give burning or scalding heat; and that is all. Yet the skin pretends to tell us of hard and soft, wet and dry, light and heavy, rough and smooth, yielding and resistant, sharp and blunt, clammy and greasy, oily and sticky, stiff and elastic, and so on. Where do we get all these experiences?

§ 10. **Kinæsthetic Sensations.** — We get them, for the most part, from the cooperation with the skin of certain deeper-lying tissues. Psychologists have long suspected the existence of a muscle sense. We now know that sensations are derived, not only from the **muscles**, but also from the **tendons** and the capsules of

the **joints**. These tissues are, of course, closely bound together, and are all alike affected by movement of a limb or of the body. Their disentanglement, from the point of view of sensation, has been a slow and difficult matter. Psychology has here been greatly aided by pathology; for there are diseases in which the skin alone is insensitive, in which skin and muscles alone are insensitive, and in which the whole limb is insensitive; so that a first rough differentiation is made for us by nature herself. It is also possible artificially to anæsthetise muscle and joint; and psychologists have devised various forms of experiment whereby some single tissue is thrown into relief above the others.

Not only, however, are the sensations of these tissues aroused by movement; they also form the sensory basis of our perception of the movement of body and limbs. For this reason they have been named **kinæsthetic**, or movement-perceiving. They are of the following kinds.

First, we have from the muscles the sensation of physical **fatigue**. If the skin over a muscle is rendered anæsthetic, and the muscle is thrown into forced contraction by an electric current, we have, to begin with, a dull dead pressure; as time goes on, or if the strength of the current is increased, this pressure becomes dragging, the sensation of fatigue; and finally it becomes sore and achy, and passes over into dull pain. From the tendons we get a sensation which, when we are actively pushing or pulling, we call **effort**, and when we are passively holding or resisting we call **strain**; it, too, passes over into pain. Lastly, from the joints we have a **pressure**: something like the pressure you feel if you

smear the right forefinger with vaseline, and turn it in the loosely closed left hand. Take a piece of elastic between the forefingers and thumbs; pull it out, and then relax it; at the moment of relaxation there is a pressure in the finger-joints, which is the specific joint-sensation.

Muscle and joint, then, yield sensations which are like those of pressure on the skin; and muscle and tendon yield sensations which are like those of pain from the skin; it is small wonder that the skin, the only portion of this whole sensory apparatus that is open to view, should ordinarily be credited with the entire number. In point of fact, there are very few of the experiences listed on p. 45 that do not imply the cooperation of some or all of the deeper-lying organs, the nerve-spindles of muscle and tendon and the nerve-corpuscles of the joints. Those that really belong to the skin owe their specific character to the context in which they are set; they change their meaning as a particular word changes its meaning from one sentence to another; think of the horribly clammy feel of a bit of cold boiled potato as you set your finger on it in the dark, and of its totally different feel when you have turned the light on and see what it is you are touching! Wetness, for instance, proves on analysis to be a complex of pressure and temperature; it is possible, when the observer does not know the nature of the stimulus, to arouse the feel of wet from perfectly dry things, such as powder, or cotton wool, or bits of metal; and it is possible to wet the observer's hand with water and yet to arouse the feel only of a dry pressure or a dry warmth or cold.

So our very first adventure in psychology brings out, as clearly as we need wish, the *difference between science and common sense.* The skin is really living upon borrowed capital; it has added to its own sensations those derived from the subjacent tissues; but common sense, blind to what it cannot see, ascribes to it a ' sense of touch ' that includes everything and examines nothing. More than this, common sense fails to draw the distinction between process and meaning which we discussed in § 6, and therefore ascribes to the sense of touch a variety of sensory experience that far outruns the facts. Hardness and softness and stickiness and oiliness and the rest are, no doubt, separate and distinct as meanings; but when we analyse the corresponding experiences, we find only the half-dozen sensations mentioned above.

§ 11. **Taste and Smell.** — The great physiologist Carl Ludwig once remarked that smell is the most unselfish of all the senses; it gives up everything it has to taste, and asks nothing in return. Taste is, indeed, an inveterate borrower; it borrows from smell and from touch, very much as the skin borrows from the underlying organs. When we have a cold in the head, we say that we cannot taste; but how is taste affected? The truth is that our nose is stopped, and we cannot smell.

If the surface of the **tongue** is explored with various sorts of stimuli, and the nose is kept out of function by plugging of the nostrils, we find **four sensations**: **sweet, bitter, sour, and salt.** Think, then, how much ' taste ' there would be in the meats and vegetables that deck our tables, if the nose were closed and condiments

were not added! The sensation of sweet is strongest at the tip of the tongue; bitter at the root; sour along the sides; salt is fairly evenly distributed over all three areas; the middle region of the tongue is insensitive to taste. The sensory cells are grouped in flask-shaped structures, the taste-buds or taste-beakers, which are again gathered together in or about the papillæ of the tongue's surface; some of these you can see, as red specks upon the dull pink mucous membrane, if you look at the tip of your tongue in a glass. There is only one instance of a blend of tastes; if sweet and salt are mixed, there appears a new taste, flat or vapid in character. Apart from these five things — sweet, bitter, sour, salt, vapid, — we 'taste' entirely by smell or touch.

Smell, on the other hand, **has more sensations than we can count or name**; more sensations, probably, than all the rest of our senses put together. We can make out certain great groups of odours: flower, fruit, spicy, musky, leek, burned, rank, foul, nauseous; we may take as examples vanilla, orange, cinnamon, sandalwood, onion, toast, cheese, opium, garbage. Realise that the flower odours comprise the scents of all the flowers, as well as those of vanilla, tea, hay, and suchlike things; or that the spicy odours comprise the scents of all the spices, as well as those of thyme, geranium, bergamot, cedarwood, and suchlike things; and you will get some idea of the variety of the world of smell. When we add that odours freely blend or combine to give new scents, you will understand that the number of smell sensations is enormous.

The sensory cells are found in two patches of mucous

membrane, each about as big as the little-finger nail, which lie saddle-wise across the blind top of the nasal cavities. They cannot be stimulated directly; but particles carried into the outer nostrils by the breath-stream, or into the inner nostrils by the air-stream thrown back in the act of swallowing, eddy upward to them and thus arouse sensation. The second mode of stimulation plays, of course, into the hands of taste; we think we *taste* when we swallow; we forget that we have inner nostrils, though we know very well that we can sniff up a lotion and bring it down into the back of the mouth. But though the stimulation is thus indirect, the cells are extraordinarily sensitive; a mere trace of odorous substance will set up a sensation; and the nose is also keenly discriminative.

Yet in spite of the tens of thousands of sensations, and in spite of the extraordinary sensitivity of the cells, we often read that in man the sense of smell is degenerating! Of this there is not one particle of evidence. We could not, truly, live by smell, as dogs do; but then men have never been dogs; and even so there are cases on record — among the Botocudos of Brazil and the aboriginal tribes of the Malay peninsula — of savage hunters who track their game by scent. There is no atom of evidence that, since man was man, his sense of smell has degenerated. It is true, on the other hand, that **the sense of smell has fallen into disuse.** The reason is that smell is essentially a ground sense, as you may convince yourself any summer day that you lie out on the grass, or any time that you are willing to spend a few minutes on a dining-room floor;

birds in general have a very obtuse sense of smell, and many of them perhaps lack sensations of smell altogether. When, then, mankind assumed the upright position, and the nostrils were lifted several feet above the surface of the ground, the sense was removed from its normal environment, and fell into disuse; sight and hearing took its place. But it may still be used. The late Sir Francis Galton, a cousin of Darwin's, once made an essay, for instance, at an **arithmetic by smell**; peppermint stood for one, camphor for two, carbolic acid for three, and so on. "There was not the slightest difficulty in banishing all visual and auditory images from the mind, leaving nothing in consciousness besides real or imaginary scents. In this way I convinced myself of the possibility of doing sums in simple addition with considerable speed and accuracy solely by means of imaginary scents. Subtraction succeeded as well as addition." Needless to say, it is not worth our while to do this sort of work; the very fact that odours have no settled system of names, like cold or pain, red or blue, shows that they have not been utilised in human life. It is fair to add, also, that sight and hearing are better suited than smell to our everyday needs; for smells very soon fade out and disappear; indeed, if they did not, the work of garbage collectors or of medical students in the dissecting room would be permanently disagreeable.

§ 12. **Sensations from the Ear.** — Sensations of hearing fall into two great groups, tones and noises. When we are speaking of **tones**, we naturally think of

the keyboard of a piano. The piano tones are, in reality, not simple tones or sensations but compound tones; and we are able, after a little practice, to break up a compound tone into its simple constituents. You may get a fair notion of a really simple tone by blowing gently across the mouth of an empty bottle. The tone is dull and hollow, as compared with the bright solidity of a piano tone, but it has also a pleasant mellowness. With these two aids, the bottle tone and the piano keyboard, we may approach our study of tonal sensations.

Tones have, first of all, the character that we call **pitch**; they lie, that is, up or down in the scale; they belong to the bass or the treble or to a middle region. The word 'pitch' means height; it is a term borrowed from perceptions of sight; and we cannot yet say certainly how it came to be applied to tones. Secondly, tones have the character of **volume**, — another borrowed word! The highest note on the piano seems shrunken, narrowed, pointed, as compared with the deepest note in the bass; and the difference comes out even more clearly with bottle tones. Thirdly, tones show a sort of recurrence. If you run your finger-nail quickly up the keyboard in a *glissando*, you perceive a change only of pitch and volume; but if you play the notes *c*, *d*, *e* in one octave and then in another and then in a third, you realise that all the sequences are alike; we talk, indeed, of playing the *same* notes in *different* octaves. This recurring character of tones is called **tonality.**

It has recently been stated that tones have a further character, that of **vocality.** Consider the series of vowels,

U, O, A, E, I (voiced approximately as in the words *moot*, *moat*, *mart*, *mate*, *meet*); there is no doubt that U suggests a low bottle tone, and I a high whistle tone. Experiments seem to show that, as we go up the scale, the tones say M–M, U, O, A, E, I, S–S, F–F, CH (the sound in the Scotch *loch*); and, curiously enough, that they say these things at intervals of an octave; so that, when we have found a pure O, we find the pure A just an octave higher, and the tones that lie between give Oa, OA, oA, according to their position. The question is still in debate; for these experiments are opposed by others, and the whole subject of the nature of vowel-sounds is very thorny. It is quite clear that high and low tones sound definitely like U and I; but some of the other vowels are far less distinct; and the point of change from vowel to vowel does not appear to be as sharp and precise as the first experiments indicated. On the whole, *we shall do best to suspend judgement.*

There are some ten thousand simple tones in the complete tonal scale; but the compound tones employed by music are only about a hundred in number, and are selected from a middle range of hearing. The compound tone, as we have said, breaks up on analysis into simple partial tones; the lowest is called the **fundamental**, the others the **overtones**. It is a remarkable fact that the overtones always stand in a definite relation to the fundamental. The various musical instruments do not, however, sound all the overtones alike; their construction favours some, and weakens or destroys others; and that is the main reason why we can tell a harp-tone, for instance, from a tone of the same

pitch played on oboe or trumpet. The compound tones thus owe their **colour** or **timbre**, in the first instance, to *the number and relative loudness of the overtones which accompany the fundamental.* Timbre has other factors; but this is the primary source of difference.

Overtones may readily be heard. Strike a *c*, very lightly, on the piano. When it has ceased to sound, strike loudly the *c* next below; you can probably, even at the first trial, hear the higher *c* in the lower. Now strike very lightly the *g* next above your higher *c*, and then the lower *c* again loudly; you will probably hear the *g*. Helmholtz, working with thin strings, was able to hear no less than fifteen overtones with the fundamental.

This blending of the partial tones in a compound tone, to give a single and unitary impression, is an example of what is called **tonal fusion**. The best fusion is that of two tones which constitute an octave; here, indeed, the blend is so close that it is often confused with unison; a soprano and a bass singer, told to sing in unison, will start off without hesitation an octave apart. Next after the octave stands the fifth (*c* and *g*); boys who think they are whistling the same notes often whistle, in fact, a fifth apart. Other pairs of tones give lesser degrees of fusion.

Tones generate as well as blend. If you sound together two high tones, such as you get from a double bicycle whistle, or from small bottles of different sizes, you hear, besides these tones themselves, a third tone, very much deeper, larger, more booming; this **differ-**

ential tone is easy to find and, once heard, cannot be mistaken. Only, the two tones must not be too nearly alike in pitch; for, if they are, you hear, instead of a differential tone, slow surges or quick rattlings of sound. Take two bottles of the same size, and mistune one of them by pouring in small amounts of water; have them blown steadily together; the course of the **beats**, as they are called, from a slow surge through a rattle to a harsh blur, may thus be followed.

Noises, which form a class of sensations distinct from tones, are nevertheless aroused by the same sort of stimuli. If a tonal stimulus is sounded for a very brief time, we hear a dry knock; if a large number of tonal stimuli are sounded all at once, we hear a buzz or crash. Noises have **pitch**; the spit of a pistol is higher than the crack of a rifle, and the sizzle of frying fat is higher than the murmur of falling rain; but no one has yet established a complete scale of noise.

The sensory cells are found in the inner ear, a tiny structure with an extremely complicated mechanism. Many different views of its action have been put forward. That which is most generally accepted was proposed by the German physicist H. von Helmholtz. *The ear contains a narrow triangular membrane which carries many thousands of stiffish cross-fibres;* and the theory is that the air-waves which impinge on the outer ear play, selectively, upon these fibres; *every air-wave throws into vibration the fibre which is tuned to respond to it.* A compound tonal stimulus is thus analysed by the membrane into a number of simple tonal stimuli, and every simple stimulus excites the nerve-fibril attached

to its particular cross-fibre. This theory explains our ability to analyse compound tones into their simple components.

The ear is, however, more than an organ of hearing. It includes organs, of a very ancient type, which help to regulate our balance in walking, our precision in turning corners or avoiding obstacles, and so on. Each ear, for instance, has three little organs that resemble minute spirit-levels, set in the three planes of space, and that give us the sensation of ' swimming ' when the head is sharply jerked, and the sensation of **dizziness** when we twirl on our heels. For the most part these organs act reflexly, without furnishing sensations; or at any rate furnish sensations of little strength, and of a pressure-like kind that blends indistinguishably with the kinæsthetic sensations from the tissues beneath the skin; but in the cases mentioned the swimmy, dizzy sensation may be noticed.

§ 13. **Sensations from the Eye.** — You may study tones by help of the piano and a few medicine bottles; but for the study of lights and colours you must go beyond household appliances, and secure a fairly large set of coloured and grey papers; sample-books may be obtained, very cheaply, from the manufacturers. You will notice, first of all, that as the world of sounds divides into tones and noises, so does the world of looks divide into what we have just called colours and lights. The colourless looks or **lights** may be arranged in a single straight line that passes from purest white through the greys to deepest black; they are, as sensations, older

than colours, just as noise is older than tone. **Colours** are more varied. Consider, to begin with, the character of colour proper or **hue**, that is, the differences of colour that show in the rainbow. Hues may be arranged, not in one straight line, but in a square. Setting out, say, from red, you pass through red-yellow or orange to yellow; that is one straight line; setting out again from yellow, you pass through yellow-green to green; from green you pass through green-blue to blue; and finally from blue you come back, by way of blue-red (violet and purple), to the original red. Colours have, besides, two further characters, that bring them into relation with lights. They differ in **tint**, that is, in darkness or lightness; brown is darker than yellow, sky-blue is lighter than navy-blue. They differ also in saturation or **chroma**, that is, in poorness or richness of hue; pinks and yellows look faded and washed-out as compared with rich reds and blues. *Tint brings colours into relation with lights*, because, if we can say that a colour is darker or lighter than a particular grey, we can also find some grey that matches it in darkness or lightness; and *chroma brings colours into relation with lights*, in the sense that the better chroma is farther off from colourlessness (that is, from grey) than the poorer chroma of the same hue and tint.

All lights and colours are psychologically simple. Paints may be mixed on a palette, and colour-stimuli may be mixed in all sorts of ways; we learn in physics that white daylight is a mixture of all the rays that are seen separately in the rainbow. Yet a white, considered just as a look, is perfectly simple; and the looks

of orange and yellow-green and green-blue are equally simple. There are no compound colours, to correspond with compound tones. Hence the number of light and colour sensations is very large, at least ten times as large as the number of simple tones.

The organ of vision is the eye; and *the eye is a little photographic camera*, with shutter, iris-diaphragm, self-adjusting lens, dark chamber, and self-renewing sensitive film. We are concerned only with the film, that is, with the **retina** or nervous network that lines the posterior half of the eyeball. It seems that *the retina is really made up of three interfused films;* for simplicity's sake you may consider them as lying upon one another, just as three saucers might do if you piled them together. The oldest and largest film, the bottom saucer, gives us the sensations of *black and white;* the middlemost, somewhat smaller, gives us *blue and yellow;* and the topmost and smallest gives us a *purplish-red and a bluish-green.* The existence and size of the three films can be shown by experiment; for we are all totally colour-blind at the edge of the field of vision, and are blind to reds and greens for some distance further in toward the centre. There are also cases of inherited **colour-blindness**, in which the eye is blind either for all colours (total colour-blindness) or for red and green alone (partial colour-blindness); the latter form is fairly common, as is natural, — for the red-green film, being the last to come, might be expected to be the first to go. Partial colour-blindness was first brought to scientific notice by the English chemist John Dalton in 1798. Dalton was a Quaker, but made no objection to wearing

the scarlet gown of a doctor of laws, because, as he said, " to me its colour is that of nature — the colour of those green leaves "; it is needless to remark that he did not see green either! The defect is practically important for pilots and signalmen, who have to distinguish red and green lights.

From these three films we get all the lights and colours that we see in the daytime, with the single exception of **neutral grey**; and this appears to come, not from the eye at all, but from the brain. It may be seen even when the retina is quite blind, provided that the rest of the nervous apparatus is in working order; and it may be seen by night as well as by day; it is mixed, physiologically, with all our sensations of light and colour, though we cannot by psychological analysis pick it out from the lights and colours. Strange enough! but we shall understand better as we go on. The German physiologist Ewald Hering has shown that *the processes which take place in the films are, in all probability, chemical processes of an* **antagonistic** *or* **reversible** *kind;* that is why we never see a bluish-yellow, or a greenish-red; if we throw on the same part of the retina, at the same time, equal amounts of black and white, or of blue and yellow, or of purplish-red and bluish-green, the chemical processes go on in opposite directions and cancel each other, with the result that we see just nothing. This antagonism can be proved, under the right experimental conditions, for blue-yellow and for red-green; if these pairs are fittingly thrown together on the retina we see, in fact, only neutral grey; so that our seeing of the same grey, when black and

white stimuli are acting together, does not necessarily mean that grey is a retinal mixture of black and white; the black and white may also cancel each other, and leave only the brain-grey to be seen.

We have, then, the three films in each eyeball, and we have the brain-grey behind them. More than this: we have a night or **twilight eye**. When colours fade out, as twilight deepens, another retinal film comes into play; the lights that we still see come, not from the black-white film, but from a fourth film, of the same size, whose only sensation is *a slightly bluish-white*. Of course, this white is always mixed, physiologically, with the brain-grey; we never see it by itself; but we owe to it, among other things, the silvery look of blues in the twilight. The very centre of the twilight eye is totally blind; if on a moonless night you want to see a faint star or a distant street-lamp you must not look directly at it, but just to one side of it. Children's fear of the dark is partly due to the fact that they cannot see what they turn their gaze upon; there had seemed to be something there, but when they looked at it, it eluded them; and if they think they see it again, and look in the new direction, again it is gone.

Now suppose that you are looking out, in daylight, over a variegated landscape. Somewhere or other you see a patch of light grey. You get this sensation from the black-white film and the brain-grey; the white-process is stronger than the black-process in the film, and the excess of white, added physiologically to the brain-grey, shows as light grey. Or again, you see a

patch of dark purple. This sensation comes from the red-green film (excess of red); from the blue-yellow film (excess of blue); from the black-white film (excess of black); and from the brain-grey. All the lights and colours of the landscape can be accounted for in the same way.

Not quite correctly, however! — there are still other factors at work. *The film-processes are antagonistic*, for instance, *even when they go on in different parts of a film;* lights and colours **contrast** with one another; if you lay a strip of grey paper on red, it looks greenish; on blue, yellowish; on white, blackish; make the trial with your own papers. So all the various lights and colours of the landscape stand out, by contrast, against one another; the eye makes their differences greater than they ought physically, from the nature of the stimuli, to appear. *Black, indeed, is wholly a contrast-sensation;* it has no physical stimulus; and you see deep black only in strong illumination.

Contrast is effective at once, the moment you cast your eyes on the landscape. *As time goes on*, however, *the opposed film-processes tend to settle down into a state of balance or equilibrium;* so that actually, if you stared at the landscape long enough, without moving your eyes, you would finally see nothing but the brain-grey. This levelling down of all lights and all colours toward neutral grey is called **adaptation.** Stand up two strips of black and white paper, side by side, and stare at their line of junction for a minute or two; even in that short time you will find that they tend toward a uniform grey. If, now, a stimulus to which you are

wholly or partly adapted is suddenly removed, the antagonism of the film-processes shows itself once more; you see an **after-image**. Lay a disc of red on grey; stare at it for half a minute; flick it away, keeping the eyes steady, and look at the grey background; you see a corresponding disc of green. White leaves a black after-image, black a white; blue a yellow after-image, and yellow a blue.

It is clear, then, that *the lights and colours of the landscape depend on many things beside the stimuli there presented;* they depend on contrast, on the previous adaptation of the eye, on the presence or absence of after-images. The main reason that we do not notice all these influences is that we ordinarily view the landscape, not for itself, but for what it means; it shows us the familiar trees and stream and houses, and we take their stability for granted. That is the main reason; it is not the only one. We have said, for instance, that the normal retina is totally colour-blind along its outer edge, and partially colour-blind for some distance in toward the centre; *the edge of the landscape ought therefore to be colourless*, and a certain outlying portion of it ought to appear simply as blue and yellow. There is no hint of these differences; and the explanation is that we are accustomed to turn our eyes directly towards what we want to see, and therefore to view it with all three of the daylight films; head and eyes **move** so easily, and we see so much better with the centre of the retina, that we totally disregard the altered look of things seen 'out of the corner of the eye.' Even if we do not, we are likely to *remember* how the things appear in direct

vision; we paint them over, so to speak, with **memory-colours**, colours that represent their natural or average appearance at the centre of the visual field; indeed, we may *paint these colours over the whole landscape, and in that way correct the changes due to contrast or adaptation.* We always talk of a certain book as brown; we recognise it in all lights, and in all states of the eye, by its brown colour; we *see* it, in memory-colour, as brown; whereas, if that same brown were shown us in all the different circumstances without our knowing it to be the same, it might give us sensations of yellow, of pale brown, of deep brown, of black. These two factors, *movement of the eyes and memory-colour*, lead us to overlook, in great part, the actual variation of lights and colours in the landscape.

A final word may be added regarding *the likeness of sight and smell.* Odours and colours fade out by adaptation; odours, like lights and colours, contrast, and even cancel one another; and smell-stimuli as well as sight-stimuli mix to produce new and simple sensations. It is highly probable that the sensory cells of smell are the seat of only a few chemical processes, by whose combination all the wealth of odours is created, just as the cone-cells of the retina are the seat of those three reversible processes (black-white, blue-yellow, red-green) whose combination endows us with the variety of daylight vision. We have as yet, however, no such definite grounds for hypothesis as we have in the case of sight; we cannot even guess what these processes are, or how many of them are taking place in the smell-membrane.

§ 14. **Organic Sensations.** — There are still other sensations, coming to us from the internal bodily organs; from various parts of the alimentary canal, from the organs of sex, from heart and blood-vessels, from the lungs, from the sheathing membrane of the bones; but it is doubtful if they are of new kinds; probably they consist simply of **pressure**, **cold**, **warmth**, and **pain**. The dull deep-seated pains that we call **aches** are, perhaps, different from the bright pains of the skin; but most of the differences among pains, differences that we express by the terms lancing, throbbing, piercing, stabbing, thrilling, gnawing, boring, shooting, racking, and so on, are either differences of time (steady, intermittent) or space (localised, diffused) or degree (moderate, acute), or else are differences due to the blending of pain with various other sensations.

The organic sensations, like the kinæsthetic, tend thus to occur in groups or complexes, and we have as yet no very sure means of disentangling them. It is, nevertheless, quite clear that in their case, as in that of the touch-blends, we have to *distinguish between experience and meaning*. **Hunger** and **nausea** seem, for example, to be very different; yet the core of both turns out on analysis to be the same dull pain; and we know that the onset of a bilious attack is often heralded by an unusually keen appetite, so that the beginnings of nausea are in fact confused with a growing hunger. The difference between hunger and nausea is due, partly to a difference in the processes which ordinarily accompany the central pain, — motor restlessness or lassitude in the case of hunger, and dizziness in that of nausea; but more

especially to a difference of meaning or interpretation; hunger stands for want of food, and nausea for indigestion.

We shall see later that *organic sensations play a large part in emotion, as kinæsthetic sensations do in perception.* Plato set the 'spirited' or 'passionate' part of the soul in the breast; the Psalms abound in phrases that suggest the same idea; we speak to-day of the *heart* coming up to the mouth, or dropping to the boots. So we read in the Old Testament that Joseph's *bowels* yearned upon his brother, and in the New Testament of bowels of compassion; and the inner stir that the writers have in mind is familiar to everybody.

§ 15. **Sensation and Attribute.** — We have been talking all this while about sensations, but we have not yet said what sensations are. They make up, as you will have guessed, one class of the mental elements, the *elementary mental processes* of § 4, that we reach by analysis of our complex experiences. They are therefore simple and irreducible items of the mental world. How shall we define them?

We can define them, in strictness, only by writing down a complete list of what we have called their characters. *Every sensation shows itself to us under various aspects*, or, as we are accustomed to say, possesses a number of **attributes**. We have been dealing, so far, with the qualitative aspect of sensations. This may itself be single; the quality of lights is just their lightness or darkness; or it may be manifold; the quality of colours can be properly described only if we take account of hue, tint, and chroma; that of tones only

if we take account of pitch, volume, and tonality, perhaps also of vocality. **Quality** is the natural thing to start out from, because it is what interests us most in everyday life, and has therefore been named; so that, when we speak of sensations, we speak of them by their qualities. There are, however, several other attributes; sensations possess **intensity**, and **vividness**, and **duration**, and some of them possess **extension**. We shall discuss these aspects later on.

Does it seem strange, now, that an elementary bit of experience should turn so many sides to the observer? Think then of chemistry, and of the chemical elements. Sodium is a chemical element; but it has many aspects or properties; physically regarded, it is soft, it is fusible, it volatilises at high temperatures; chemically, it combines with oxygen, it decomposes water, it is univalent, it has a low atomic weight, it is electropositive, and so forth. Sodium cannot be reduced, chemically, to anything simpler than itself, but it is nevertheless many-sided. The same thing is true of sensations.

So a complete list of the aspects or attributes of sensation is as near as we can come to a definition. But since that sort of statement is clumsy; since we cannot make it complete till we have observed the sensations under all their possible aspects; and since we know that mental processes are correlated with processes in the nervous system; we may adopt another plan, and *define sensation by reference to the special bodily organ with which it is connected.* Sensations are then elementary mental processes that come to us by way of skin, muscle, ear, and the rest of the sense-organs.

§ 16. **The Intensity of Sensation.** — A sensation may remain the same in quality, and yet vary in strength or **intensity.** A pressure may be the pressure of an ounce or of half-a-pound; it is always pressure, the same quality, but its intensity differs. The tone you get by blowing across the mouth of a bottle may be loud or faint, though it is still the same pitch, the same tone. The weight you carry may strain the arm very little or a great deal; the sensation of strain from the tendons is the same in both cases, but its intensity is different.

The study of this attribute of sensations has led to *the discovery of a psychological law*, which has much practical importance. Suppose that we are working with intensities of noise, the noise made by the drop of an ivory ball upon an ebony block. Suppose that, by varying the height from which the ball falls, we have found a series of intensities of sensation *a*, *b*, *c*, *d*, *e*, which may be represented by the numbers 1, 2, 3, 4, 5; a series, that is, in which the difference between the two noises *a* and *b* is equal in sensation to the difference between *b* and *c*, or between *c* and *d*, or between *d* and *e*. That sounds a little difficult; but the series may really be established without much trouble. Now, what about the stimuli, the heights of fall? Must the ball drop twice as far for *b* as for *a*, three times as far for *c* as for *a*, and so on? No: *equal differences in intensity of sensation do not correspond with equal differences in intensity of stimulus. Equal differences in intensity of sensation correspond rather with* **relatively** *equal difference in the intensity of stimulus.* In other words,

the sensation-series 1 2 3 4 5 corresponds with a stimulus-series of the type 1 2 4 8 16;

or, mathematically expressed, *an arithmetical series of intensities of sensation is correlated with a geometrical series of intensities of stimulus.* In the instance given, the exponent of the geometrical series is 2; but that is only an imaginary instance; in the case of **noise** the actual exponent is $\frac{4}{3}$, so that

the sensation-series 1 2 3 4 5 corresponds with the stimulus series 1 $\frac{4}{3}$ $\frac{16}{9}$ $\frac{64}{27}$ $\frac{256}{81}$;

or, if we take units of some sort, such as millimetres of height of fall,

the sensation-series 1 2 3 4 5 corresponds with the stimulus-series 81 108 144 192 256.

This law of correlation was first formulated by the German physiologist E. H. Weber in 1834 as follows: "in comparing objects and observing the distinction between them, we perceive, not the difference between the objects, but the ratio of this difference to the magnitude of the objects compared." Weber speaks of objects, because he was thinking of experiments that he had made with weights; he should have said sensations. His law holds, over a middle range of intensities of sensation, for **lights**, **sounds**, **pressures**, **various kinæsthetic complexes**, and **odours**. Its validity in the fields of taste and temperature is doubtful.

It is because of Weber's law that we are able to ignore the manifold changes of illumination to which we are exposed in the course of the daylight hours; that the painter, who cannot at all reproduce by his pigments the absolute intensities of light in nature, can neverthe-

less give us a recognisably true copy of any natural scene; and that a large block of seats in the concert-room, at a moderate distance from the stage, can all be sold at the same price and all have equal advantages for hearing. You will readily find other instances of its working, if you are clear as regards the principle involved; namely, that the less you have of anything, the less need be added, and the more you have, the more must be added, to make an appreciable difference; or, on the negative side, that you are not likely to notice any difference in your surroundings, so long as the relations of the stimuli remain unchanged. So Weber's law furnishes yet another reason for the apparent stability of the landscape that we discussed on p. 63.

Questions and Exercises

(1) Mark out, by indelible ink, a sq. cm. upon the outer surface of the forearm. Make upon transparent paper three maps of the area, marking hairs, veins, etc. Work over the area (*a*) with the horsehair, for pressure spots; (*b*) with a warmed carpenter's spike, for warm spots; and (*c*) with a cooled spike, for cold spots. Enter the spots, as you find them, on the maps; remember to dot the hair down for pressure, but to draw the spike slowly and evenly along the skin for temperature. Lay the three maps together, and note the distribution and the relative number of the spots.

(2) After shampooing, the scalp is sensitive and irritable under the brush. Why?

(3) When you are writing with a pencil, or prodding in a pool with a stick, the sensations seem to come from the end of the pencil or stick. What organs are involved? And why should the sensations be localised as they are? Try to think out some experimental means of attacking this question.

(4) What sensations do you get in the act of yawning? What in that of swallowing? What unusual sensations do you have, from the face, after you have been running hard?

(5) How do sour and sweet in the mouth affect the sense of touch? Make solutions, in varying strengths, of sugar and of the juice of some very sour fruit; leave plenty of time between observations.

(6) Prepare some bits of apple, onion, and raw potato. Close your eyes and hold your nose; then pick up these morsels at random, and chew them. Can you tell the difference? How?

(7) Is there any evidence of taste contrast?

(8) Secure adaptation to the scent of camphor; breathe regularly, and note the length of time necessary for the odour to disappear. Now smell at vanilla, heliotrope, absolute

alcohol. Do you smell them? Try to account for the result, arguing by analogy from what you know of colours.

(9) The next time that you listen to an orchestra, pick out the tones of the various instruments, and try to describe their timbre; do not be afraid to string adjectives together, but be sure that you hear what you put down. Later, look up in a reference-book the composition of these various compound tones, and see if there is any correlation between your description and the number and loudness of the overtones.

(10) If you drop a block of wood on a desk, the sound is simply noisy. If the same block forms part of a xylophone scale, and is struck with the wooden hammer, it gives a tone. How is this?

(11) When you next go to a reception, stand outside the main rooms for a minute, and try to determine the pitch of the buzz of voices; try to sing the pitch yourself. Is the buzz tonal or merely noisy?

(12) When you are listening to beats, do you hear one beating tone, or both the primary tones beating? If one tone only, is it identical with either of the primaries?

(13) Test the law of visual antagonism by getting the after-images of a number of colours.

(14) To prove normal colour-blindness, get a small square of red glass; stand before a window, with your left eye closed and your right eye fixed upon some distant point; bring the red glass slowly into the field, with the left hand, and note its changes.

(15) Can you suggest experiments for working out in detail the laws of visual contrast? Try to think what sort of things would be likely to enhance or to reduce the contrast-effect.

(16) Could a man go through life, and take an ordinary place in society, without knowing that he was colour-blind? Give your reasons.

(17) Blue and yellow are antagonistic; yet blue and yellow paints, mixed on the palette, give green. How is this?

(18) Dalton says: "In lecturing on optics I got six ribands, — blue, pink, lilac, — and red, green, and brown, — which matched very well, and told the curious audience so. One gentleman came up immediately afterwards and told me he perfectly agreed with me; he had not remarked the difference by candlelight." How could these triads have been confused? and would the candlelight make any difference?

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The special references to *smell* will be found in E. B. Tylor, Anthropology, 1881, ch. ix., 207; W. W. Skeat and C. O. Blagden, Pagan Races of the Malay Peninsula, i., 1906, 200; F. Galton, Psychological Review, i., 1894, 61 ff.; and those to *Dalton* in W. C. Henry, Memoirs of the Life and Scientific Researches of John Dalton, 1854, 24, 49, 172, 187. For the term *kinæsthesis* see H. C. Bastian, The Brain as an Organ of Mind, 1885, 543.

CHAPTER III

Simple Image and Feeling

Conceptions and apparitions [sensations and images] are nothing really but motion in some internal substance of the head; which motion not stopping there, but proceeding to the heart, of necessity must there either help or hinder the motion which is called vital; when it helpeth, it is called pleasure; but when such motion weakeneth or hindereth the vital motion, then it is called pain. — Thomas Hobbes

§ 17. **Simple Images.** — Common sense draws a sharp distinction between our present perception of an object or event, and our later revival of it in memory; and psychologists have been accustomed, in the same way, to distinguish the simple sensation, the elementary process in perception, from the **simple image**, the elementary process in memory. In fact, however, *it is very doubtful if there is any real psychological difference between sensation and image.* The statement is often made that the image is weaker, fainter, more fleeting than the corresponding sensation. Thus, the great philosopher David Hume (1711–1776) wrote: "All the perceptions of the human mind resolve themselves into two distinct kinds, which I shall call *impressions* and *ideas*. [Hume's terminology is different from ours.] The difference between these consists in the degrees of force and liveliness, with which they strike upon the mind." Hume himself admits that "in sleep, in a fever, in madness, or in any very violent emotions of soul, our ideas may approach

to our impressions; as on the other hand it sometimes happens that our impressions are so faint and low, that we cannot distinguish them from our ideas." It is certain that sensation and image are often confused; and some writers have accordingly proposed to drop the term 'image' and to replace it by 'secondary sensation.' Let us look at the facts.

There is no department of sense in which sensation stops entirely when its stimulus is removed; in all cases, even in that of sound, the sensation is prolonged, for a longer or shorter time, and either after an interval or without interruption, in what is called the **positive after-image**. Blow out a match in the dark, and wave the glowing stem about; you see complete circles or figures of eight; the sensation persists, although the stimulus has passed from one part of the retina to another. In some departments, the positive is followed by a **negative after-image**; we have already mentioned the antagonistic after-images of sight. So the removal of a continued warm stimulus leaves a sensation of coolness; and the swimming in the head that you feel while twirling round is followed, when you come to rest, by a swimming in the opposite direction. Lastly, the name of **memory after-image** has been given to an experience which is most familiar, perhaps, in the taking of dictation; as you write the words last spoken, the speaker's voice still rings in your ears; the sound hangs for a few seconds, as if arrested, and your pen is guided by the mental echo. Similarly, an attentive glance at an object may set up a sort of photographic image that remains distinct for several seconds.

All the after-images are sensory in character. So too are the **memory colours** that we habitually lay over familiar objects (p. 63), and that make us see snow as white and gold as yellow and coal as black, just because they are ordinarily or typically white and yellow and black. So also are the **recurrent images**, those troublesome and haunting images to which most of us are subject at times: the tunes that run in our head and that we cannot get rid of, the rows of figures that obsess us after a long morning of calculation, the bright disc that keeps cropping up after we have spent several hours at the microscope. So, again, are the images that serve to complete and round out an imperfect perception. A favourite device of modern advertising is to outline the human figure only in part and to leave the remainder to the imagination; and you will perhaps notice, if you look attentively at such a figure, that the outline, so far as the suggestion of the neighbouring lines is unambiguous, is indeed completed in image, black on white or colour on colour; only where the completion is uncertain do the images fail. These **tied images**, so called because they are unequivocally bound up with the sensory portion of the perception, occur also in the sphere of sound; a missing orchestral part, if it is familiar, may be clearly heard by the conductor.

Not everyone has recurrent images; and perhaps only a large minority have tied images. The image — even if we decide that it is only a secondary sensation, psychologically indistinguishable from sensation — nevertheless represents a later stage of biological development than the sensation proper, and our equipment of images is

correspondingly variable; your own experience may be richly imaginal, while your friend, under the same conditions, has hardly a trace of imagery. Those who do possess recurrent and tied images agree that they are distinguished from sensations rather by their context, by the presence or absence of certain other processes, than by any difference of nature. The same thing holds of those abnormal phenomena to which Hume referred. **Hallucinatory images** are by no means uncommon in the drowsy period that precedes sleep; we hear the telephone bell, or we hear our name called; some of us — there are, again, great differences in individuals — have hallucinations of sight. **Dream images** also differ markedly from individual to individual; but the dream is nearly always accepted as a real event. One of the most puzzling facts in this connection is the occurrence of concomitant or **synæsthetic images**. In the commonest case, that of **coloured hearing**, any auditory stimulus arouses, along with the appropriate sensation of hearing, whether tone or noise, a visual image of light or colour. The sound of the word Tuesday, for instance, may be seen as a light grey-green followed by a yellow! We might suppose, at first thought, that coloured hearing is due to association, to a connection between sight and hearing set up in childhood and continued into adult life; but the evidence points to some inborn connection in the nervous system: coloured hearing tends strongly to run in families. Moreover, we know of no natural or normal association of colours with tones, although the attempt has often been made to illustrate music by colours; the recent

colour-scoring of the Russian composer Scriabin is, for instance, nothing more than an idiosyncrasy, and will make no general or permanent appeal to the musical public. There are many other kinds of synæsthesia, besides this connection of sight and sound; and we have no reason to think that every instance is to be explained in just the same way; in all cases, however, we have a particular sensation uniformly accompanied by another, which we may call either a secondary sensation or an image of sensory character.

Coming back to the normal life, we have next to note the part played in certain minds by **habitual images.** Just as, in Wagner's operas, the performer comes upon the stage to the accompaniment of some characteristic musical phrase, some 'motive,' as it is called, which recurs again and again as he enters and reenters to take his share of the action, so in minds of the imaginal type such general notions as 'virtue' and 'commerce' and 'summer' may regularly call up mental pictures, little groups of images, which illustrate or characterise the notions: thus, virtue may be pictured mentally by the flash of a human figure, standing very upright. These pictures are usually incomplete, mere impressionist sketches; but they may remain unchanged for years.

Finally, we come to the images which enter into our ideas of memory and of imagination. We discuss these ideas later; here we need only say that the psychological distinction between sensation and image, if it is to be drawn at all, must be drawn between sensation and the **free images of memory and imagination**, and cannot be drawn earlier. Some psychologists believe that a

memory-image can always be distinguished from a sensation, that the two processes differ in their intrinsic nature. It is difficult to put the question to the test of experiment; but what evidence we have seems to look the other way. We shall do best to suspend judgement.

The word 'image' is unfortunately used, as the foregoing paragraphs have shown, both for the simple image and for groups or clusters of images; thus, the recurrent image and the habitual image are always complex. Summing up our results, with this warning in mind, we may say that positive and negative after-images, memory colours, and synæsthetic images are definitely sensory in character; that the simple images which make up memory after-images, recurrent and tied and habitual images, hallucinations and dreams, appear to be of the same kind; and that the simple images which compose our ideas of memory and imagination may or may not be intrinsically different from sensations. The simple image may therefore be defined as *an elementary mental process, akin to sensation and perhaps indistinguishable from it, which persists when the sensory stimulus is withdrawn or appears when the sensory stimulus is absent.* We may say further that, while every normal person has very much the same equipment of sensations, there are great individual differences in the matter of secondary sensations or images; in some cases they are interwoven into the whole tissue of experience, in others they are infrequent or even lacking; we shall see presently how they may be replaced. In general, images of sight and sound are common; then come images of touch and

temperature, and then again images of taste and smell, which are uncommon; organic images are very rare. Kinæsthetic images undoubtedly occur, and probably occur frequently; but they are likely to blend with kinæsthetic sensations, and so to escape notice.

§ 18. **Simple Feelings and Sense-Feelings.** — Many of our experiences are indifferent; but many of them, again, are pleasant or unpleasant. These two words, *pleasant* and *unpleasant*, denote elementary mental processes of a different sort from sensations and images; they are known as **simple feelings**. The term 'feeling' is itself even more ambiguous than the term 'image'; it is natural to speak of 'feeling' a strain or effort, a warmth or cold; but we shall henceforth use it only in its technical meaning, to indicate the way in which stimuli affect us, pleasantly or unpleasantly. We must discard altogether the words *pleasure* and *pain*, although they have long been current as the names of the simple feelings, and although they are much less clumsy than pleasant and unpleasant. We discard them because pain is a sensation (p. 43); and pains, while usually unpleasant, may at times be pleasant; the scratching that relieves an itch and the nip of the wind on a brisk winter's day are both pains, but they are also both pleasant.

The main difference between sensation and simple feeling is that a feeling cannot be made the object of direct attention. Try to attend to the pleasantness or unpleasantness of an experience, and the feeling evaporates, eludes you; it is like clutching a ghost; you find your-

self beyond the feeling, so to speak, and face to face with some obtrusive sensation or image that you had no wish to meet. This peculiarity of feeling must, of course, be taken account of in our conduct of the psychological method of observation. The formula of observation (p. 19) was:

psychological (vivid experience ⟶ full report).

In the case of sensation, the observer is set or disposed, beforehand, to attend to sensation and to report upon sensation; the sensation comes, and is attended to; and the report which follows is determined, under the influence of the preliminary set or disposition, by the nature of the sensation. In the case of feeling, the observer is set to attend to sensation, but to report upon the feeling which accompanies the sensation; the sensation comes and is attended to; and the report then describes, under the influence of the preliminary set, the feeling which accompanied the sensation. That sounds a little paradoxical; but the method is not difficult in practice; and it has the advantage that we can use all manner of sensory stimuli (colours, tones, everything) in our study of feeling.

We find, first of all, that *pleasant and unpleasant are really opposites;* the colour or tone that is most often reported as pleasant is least often reported as unpleasant, and conversely. An obvious result? Not at all; for what is obvious to common sense demands very careful consideration at the hands of science; and the fact that, in this instance, common sense turns out to be right does not at all mean that we should have been

justified in taking it for granted. We find, secondly, that *intensity of feeling behaves like intensity of sensation* (p. 67); the more pleasant or unpleasant an experience is, the more must the stimulus be changed if we are to feel a difference; and the less pleasant or unpleasant it is, the less change need be made to produce a change of feeling.

There is no convincing evidence of any qualities of feeling other than pleasant and unpleasant. There is evidence, on the other hand, that the simple feelings form intimate and characteristic blends with sensations, and especially with kinæsthetic and organic sensations; we may call such blends **sense-feelings**. Every sensory stimulus, even so local and trifling a thing as a tone of moderate intensity, sets up a widespread organic disturbance: a result that is natural, perhaps, in view of the manifold interconnections within the nervous system, but that we are nevertheless likely to overlook. This organic stir brings out kinæsthetic and organic sensations which may form the body of a sense-feeling, developed round about the disturbing tone, and giving it a peculiar tinge of feeling that it would not otherwise possess. The same thing holds of other stimuli. We can distinguish *six types or classes of these sense-feelings: the agreeable and disagreeable, the exciting and subduing, and the straining and relaxing.* Tastes and smells are preeminently agreeable or disagreeable. Deep tones are solemn and serious, that is, subduing; high tones are cheerful and playful, that is, exciting. The painter's ' warm ' colours, red and yellow, are exciting; his ' cold ' blues are subduing; the gloom of a darkened room is positively depressing.

Warmth and cold are themselves exciting and subduing. The straining and relaxing feelings are dependent upon the temporal course and succession of sensations; the interminable pedal-point in $E\flat$ with which Wagner begins the *Ring* sets up a feeling of tension which is relaxed when the $B\flat$ is added, only to grow again, and again relax when new tones are introduced; and if you follow the strokes of a slow-beating metronome you get a similar alternation of the two sense-feelings. Notice that the six names are all alike class-names; *the sense-feelings themselves appear in numberless variety;* but any particular sense-feeling may be referred to one or more of the classes. Notice also that the paired names are all opposites: a sense-feeling may be agreeably exciting, or agreeably subduing, but it cannot be excitingly subduing; and so on with the rest. Remember finally that the simple feeling taken alone, and not blended with sensory qualities into a sense-feeling, is always a bare pleasant or unpleasant.

We must next discuss *the organic disturbances that accompany feeling itself.* We know that feelings 'express' themselves in various ways; we blush for shame and pale from fear; we shake with rage, and our 'heart beats high' with hope. Now it is possible to measure all these organic changes; to record the rate and height of pulse, for instance, or the variation in the volume of a limb according as blood flows into it or is withdrawn from it; physiology puts the necessary instruments at our disposal. The observer may therefore be harnessed to some such system of recording apparatus, and may be subjected to some pleasant or unpleasant stimulus; he

reports what he feels, and the experimenter is able to compare the report with the record from the instrument. The results of work of this sort are summed up in the following table; where a + stands for an increase, and a − for a decrease, of rate or height or volume, as the case may be.

	Pleasant	Unpleasant
Rate of pulse	−	+
Height of pulse	+	−
Volume of arm	+	−
Rate of breathing	+	−
Depth of breathing	? −	? +

The table asserts that, during a pleasant experience, our pulse is slowed and heightened; blood flows from the trunk into the extremities; and our breathing quickens and, perhaps, grows more shallow. During an unpleasant experience, the reverse of all these things takes place.

The pleasant and unpleasant experiences here referred to are, of course, agreeable and disagreeable sense-feelings; and we have the right to correlate the organic changes with pleasant and unpleasant feeling only because they remain the same so long as feeling remains the same, whatever may be the character of the sensory stimulus. There can be no doubt that similar tables may presently be made out for the other sense-feelings; indeed, that must be the case, in so far as the sense-feelings are stable blends of simple feeling with sensations. But it is not easy, in the case of the other pairs, to secure a stable blend, to keep the nature of the 'excitement' or the 'relaxation' just the same from experi-

ment to experiment; and we shall therefore make no attempt here to list their bodily expressions. We come back to the general subject of expression when we deal with emotion (§ 51).

Can we now say anything definite about *the nervous correlate of the simple feelings?* Can we say what is going on in the nervous system when we feel pleasantly or unpleasantly? Unfortunately no: *we have many theories, but no positive knowledge.* There is, however, one view of feeling which has persisted from Aristotle to the present day; and we must say a word about it, if only because you cannot read far in psychology without running against some form of it, and you should not blindly accept it. We may call it the **biological theory** of feeling. Aristotle said that pleasure (we must now use the old-fashioned terms) accompanies the unimpeded exercise of any faculty, that is, the healthy exercise of any mental faculty upon its appropriate object; and that pain accompanies impeded activity. In more modern language, pleasure is for Aristotle a matter of efficiency. Herbert Spencer puts the same idea into evolutionary language; "pains are the correlatives of actions injurious to the organism, while pleasures are the correlatives of actions conducive to its welfare." Does this statement really mean, though, that a man's personal pleasures are always good for him and his personal pains bad for him? — because, if that is meant, it is not difficult to think of any number of cases to the contrary. No, not quite that; Spencer would qualify by saying that nature can only strike an average for the species; she cannot attend in detail

to the individual; the sentence means that on the whole, in the long run, pleasures are good and pains are bad for us. We might reply that it is rather a poor average that makes the tearing off of a finger nail so exquisitely painful, though the loss hardly matters, and that allows the ravages of pulmonary tuberculosis to run so long a course before warning is given to the suffering organism. But let us offer a definite objection: a surgical operation is not pleasant; yet it may be the one thing necessary to save life. Spencer has his answer: "special and proximate pleasures and pains must be disregarded out of consideration for remote and diffused pleasures and pains." In that case, however, — if the feelings are merely witnesses to the state of affairs at the moment, and not prophets of the future, — the correlation does not help us very much; nature's achievement is less important, even for the species, than it seemed at first. Or take another objection: I am overheated, and I sit in a cooling draught; the result is catarrh or pneumonia; yet the coolness was pleasant. To be sure, says the biologist; and the local effect was good for you; the testimony of the feelings is limited in space as I have just acknowledged it to be limited in time. Again, however, we must rejoin that, in that event, the correlation is of less importance to the race than it was asserted to be; if things that are 'sweet in the mouth' are going to be 'bitter in the belly' we want to know it; it is small comfort to be told that the organ of taste is benefited by the pleasant sweetness. And so the argument might go on.

There is yet another difficulty. "Every pleasure,"

says Spencer, "increases vitality; every pain decreases vitality. Every pleasure raises the tide of life; every pain lowers the tide of life." Yet we read elsewhere that "pleasures are the incentives to life-supporting acts, and pains the deterrents from life-destroying acts." Pain, then, is thoroughly bad for us, because it is detrimental to life; but pain at the same time is thoroughly good for us, because it prevents our doing what is detrimental to life. Pain as detrimental ought to have been eliminated by natural selection; pain as warning of what is detrimental has been conserved by natural selection. Can the two points of view be reconciled?

It would be foolish and overhasty to reject outright the biological view of feeling; the very fact that it has lasted through so many centuries and, in some form or other, has appealed to so many psychologists — the quotation which heads this chapter is a case in point! — raises a presumption in its favour. Our conclusion must rather be this: that general formulas, which need to be qualified almost as soon as they are phrased, and which lay themselves open to all kinds of specific objections, cannot help us to a psychology of feeling — or of anything else. When we have found out, by detailed experimental work, what the nervous correlate of simple feeling really is, then we may perhaps advance to some general biological view; but the detailed work must come first.

Questions and Exercises

(1) Answer the questions printed on pp. 255, 256 of F. Galton's *Inquiries into Human Faculty and Its Development* (Everyman's Library, E. P. Dutton & Co., New York; price 35 cents). When you have answered them, read Galton's discussion of mental imagery, pp. 57 ff. (You will find many other interesting things in the book; for instance, the discussion of synæsthesia, pp. 105 ff.)

(2) Try to secure a memory after-image, (*a*) by glancing attentively at a lamplit study-table, and then closing the eyes; and (*b*) by listening attentively to a short musical phrase or to a dictated sentence. How do you distinguish this image from a positive after-image?

(3) Describe the tied images that you find in the following figure.

(4) How is it that very great differences in mental imagery may go undetected in everyday life?

(5) Try to give instances, from your own experience, (*a*) of the confusion of sensation and image, (*b*) of memory-colours, and (*c*) of the alteration of a perception by an image-complex. (An instance under (*c*) would be, for example, your failure to find something that you had lost, although it lay in plain sight, because you had a mental picture of it, different from its actual look in perception.)

(6) The following have been given, by various psychologists, as differences between sensation and simple feeling. What have you to say about them? (*a*) Sensation depends upon a present stimulus; feeling depends not only upon stimulus, but upon the whole state of the individual at the moment. (*b*) Sensations range between maximal differences; feelings between maximal opposites. (*c*) All sensations have

corresponding images; there is no image of pleasantness or unpleasantness. (*d*) Sensations may be localised; feelings are not localisable.

(7) Professor Wundt, who first distinguished the groups of agreeable and disagreeable, exciting and subduing, straining and relaxing feelings, thinks that these experiences are not sense-feelings, but are all simple feelings; so that there are three dimensions of simple feeling, the pleasant-unpleasant, the exciting-subduing, and the straining-relaxing, corresponding in a way with the three dimensions of space. What criticism have you to offer? And how would you test Wundt's theory?

(8) Do you think that a mixed feeling, a feeling which is at the same moment pleasant and unpleasant, is a possible experience? Give your reasons, and support them by observations. Can you remember any references, that bear on the question, in poetry or fiction?

(9) Analyse the sense-feelings of smarting pain, of health, of hunger, of oppressive heat.

(10) Can you give, from your own experience, any evidence for the belief that Weber's law holds for intensity of feeling?

(11) The chapter teaches that the pleasantness of a perfume, of a word of praise, and of a kindly action is, as simple feeling, identical; there are no qualitative differences in the pleasant. To many persons this teaching is repugnant. Why? and how should their objections be answered?

(12) Define (without looking at the book!) sensation, simple image, simple feeling.

References

On images: Galton, as above; D. Hume, A Treatise of Human Nature, 1739, bk. i., pt. i., § 1; J. E. Downey, An Experiment on Getting an After-image from a Mental Image, in Psychological Review, viii., 1901, 42; E. B. Titchener, Lectures on the Experimental Psychology of the Thought-

processes, 1909, Lect. 1; Text-book of Psychology, 1910, 194 ff.

On feeling: H. Spencer, The Principles of Psychology, i., 1881, ch. ix.; The Data of Ethics, 1887, chs. vi., vii.; J. M. Baldwin, Mental Development in the Child and the Race: Methods and Processes, 1906, ch. xvi., § 3; W. Wundt, Outlines of Psychology, trs. C. H. Judd, 1907, §§ 7, 12; E. B. Titchener, Lectures on the Elementary Psychology of Feeling and Attention, 1908, Lects. 2–4; Text-book of Psychology, 1910, 225 ff. For experimental methods: Titchener, Experimental Psychology, I., i., 1901, ch. vii.; ii., 1901, ch. vii.; C. S. Myers, A Text-book of Experimental Psychology, i., 1911, ch. xxiv.

STUDENTS' MEDICAL
TORONTO UNIV

CHAPTER IV

Attention

Quaeritur utrum intellectus noster possit multa simul intelligere. Respondeo dicendum quod intellectus quidem potest simul multa intelligere per modum unius, non autem multa per modum multorum. — St. Thomas Aquinas

§ 19. **The Problem of Attention.** — We have now finished our survey of the elementary processes of mind; *all our complex experiences may be analysed into sensations, simple images, and simple feelings.* There has been no special difficulty, so far, in exchanging the common-sense point of view for that of scientific psychology. You may not have realised, positively and intimately, that sensations and simple images are all meaningless; that we have described them simply as processes, as experiences going on; you may have been surprised, in view of the everyday distinction of perception from memory and imagination, to find that the simple image is only doubtfully to be distinguished from the sensation; and you may also have been surprised to learn that the feelings owe their manifold variety of tang and tincture to the sensations with which a simple feeling, pleasant or unpleasant, is blended. There is, however, no real difficulty, when once these things are pointed out, in taking up a scientific standpoint towards the mental elements.

As soon as we pass to consider *attention*, the case is changed; we come into definite conflict with popular psychology. **Common sense regards attention as a voluntary concentration of the mind.** For instance: I am sitting at my desk, thinking out and writing down the sentences of this paragraph. As I write, I am subject to all sorts of sensory stimuli; the temperature of the room, the pressure of my clothes, the sight of various pieces of furniture, the sounds from house and street, the scents coming from the room itself or borne in through the open window, organic excitations of various kinds. I could easily let my mind wander; I could lapse into reminiscence, or give the rein to my imagination. Yet I am perfectly well able to ignore all these distractions, and to concentrate upon my self-imposed task. Surely, says common sense, surely the whole situation implies a selective and spontaneous mental activity; I give my attention, of my own accord, to a certain topic that I have myself chosen; I could, if I liked, attend to something wholly different. That is *the nature of attention as it is viewed by common sense.*

Let us see, however, how things look when we try to **describe** attention, without making any effort to interpret or explain it. Suppose that, as I sit writing this paragraph, I am called to the telephone, or am interrupted by the entrance of a friend. My attention is thus diverted to a new object. What happens? Something happens that we can only describe as **a shift of the vividness of our mental processes.** A moment ago, my psychological ideas were vivid, set (as it were) in the focus of attention, while all other ideas and per-

ceptions were dim and marginal; now the incoming ideas — my friend's business or the subject of the message — drive to the front; they in their turn become vivid and focal, while the psychological ideas, just lately central and dominant, fall back, along with the perception of my sensory surroundings, into the dim background. *Attention, therefore, if we consider it purely descriptively, hinges not upon mental activity, but upon the vividness of mental processes;* and the state of attention may be described as a certain pattern or arrangement of mental processes; whenever our experience shows the pattern of vivid centre and dim background, of bright focus and obscure margin, then we have attention before us.

What, then, is **vividness**? The answer has been given already (p. 66): vividness is *one of the universal aspects or attributes of sensation.* Just as all sensations vary in intensity, so do all sensations vary in vividness. If you want a more positive answer; if you want to know how precisely vividness 'feels' in experience; observe your mental processes now, as you are puzzling over this book; the difference between foreground and background, focus and margin, — between the dominant ideas aroused by what you read, and the obscure perceptions derived from your surroundings, — will show itself at any rate in the rough. *Be careful not to confuse vividness with intensity:* when you are listening intently for a very faint sound, the sound, as it comes, is the most vivid experience you have, although it is near the lower limit of intensity; and when you are absorbed in your work, the sound of the dinner-gong in the

hall may be very dim and obscure, although it is loud enough to be heard all over the house. *Be careful, too, not to confuse sensory vividness with definiteness of meaning* (p. 29). A patch of colour in an oil-painting may strongly attract your attention, may thus be extremely vivid, and may yet be altogether unintelligible; and another patch of colour, that you have passed over with 'half a glance' and that remains permanently in the background of experience, may carry the perfectly definite meaning of a dead soldier. Differences of vividness are neither differences of strong and weak in sensation, nor of distinct and indistinct in understanding; they are more like differences of robust and weakly, or of self-assertive and retiring.

These preliminary remarks are, perhaps, enough to show the nature of *the problem that attention sets to a scientific psychology*. We shall be concerned with sensory vividness; we have to find out under what circumstances a sensation or image becomes vivid, and under what circumstances it becomes obscure; we have to trace the pattern of attention in greater detail and with more accuracy; we have to ask how many sensations may be vivid at the same time, and how long they remain vivid; and so on. We must keep the common-sense view always in mind, so that the scientific alternative stands out clearly and distinctly against it; and we must take scientific account of all that common sense lays down.

§ 20. **The Development of Attention.** — If we consider a large number of cases of attention, we find that

they fall into three great groups; and each one of these groups seems to represent a stage in the development of mind at large, a level of mental evolution. We speak accordingly of **primary**, of **secondary**, and of **derived primary attention**. Let us consider them in order.

(1) *Primary attention.* — There are certain classes of stimuli that force attention upon us; they take us by storm, and we can offer no resistance; when they appear, we must attend, whatever our preoccupation may be. *Intensive* stimuli belong to this class: very loud sounds, very bright lights, strong tastes and smells, severe pressures, extreme temperatures, intense pains, one and all take possession of us, dominate us in their own right. A stimulus that is often *repeated* is also likely to attract the attention, even if at first it went unremarked. *Sudden* stimuli, and sudden changes of stimulus, have the same effect. So with *movement:* the animal or bird that crosses the landscape, the melody that rises and falls to a steady accompaniment, the insect that crawls over our hand as we lie on the grass, all alike constrain our attention. A *novel* stimulus has the same power; it stands alone and unrelated; it startles or arrests us.

Here then is a fairly long list — high intensity, repetition, suddenness, movement, novelty — of controls to which the human organism is subject. Let any one of them come into play, and *the corresponding sensation is made vivid*, shoots to the focus, engrosses us. We may very quickly shake off the control, and return to the business that it interrupted; but we cannot altogether escape it. The irresistible appeal of these various modes

of stimulation shows us attention at its first developmental level.

(2) *Secondary attention.* — This casual and forced attention is not, however, what we ordinarily mean when we speak of ' giving attention ' to something. We mean rather the sustained attention that we pay to a task, a lecture, a puzzle; we often mean an attention that goes against the grain, in which *we* seem to do the forcing, holding our mind by main force upon a tedious and uninteresting subject. Is not this secondary attention very different from primary attention? Let us see.

If you think how many sense-organs man has, all of them open to manifold stimulation at the same time; and if you think, further, how many different lines of interest man has, all of them likely to bring up ideas of memory or ideas of imagination; you will realise that only very powerful stimuli, those that make an unescapeable biological appeal to the organism, can compel attention — that is, can thrust their sensations to the focus — as if in disregard of competition. Such stimuli are *hors de concours;* all the rest have to face their rivals. This fact gives us the answer to our question. Secondary attention is in reality nothing else than *a conflict of nerve-forces, each one of which, if it were acting alone, would make its sensation or image the most vivid bit of experience at the moment, but each one of which is continually checked and thwarted by other forces that are urging their own sensations or images to the front.* We might say, in brief, that secondary attention is a conflict of two or more primary attentions; but we must remember that the actual fighting is done in the nervous system;

we shall say more of that presently. We can observe some part of this struggle; our mind wanders, our eye is caught by some chance movement and we lose the thread of our work, we surprise ourselves thinking of something else, we look at our watch to see how the hour is going; in a word, the focal processes are instable; now one and now another perception or idea becomes more vivid than the rest; and the continual shift of vividness is proof of the conflict of the underlying nerve-forces.

And the outcome? The outcome is that *the stronger side always wins*. Not necessarily the stronger side as we observe it; there may be a more impressive array of ideas on the side that finally gives way; but the side that has the stronger nerve-forces. It is quite certain that *nervous forces or tendencies* — think of the force of habit! — *may guide and direct the course of our thoughts, even though they do not themselves contribute to thought*, even though (that is) they have no sensory or imaginal correlates. We shall have more to say of these guiding tendencies later; meantime let us give an illustration of their power. Suppose that an observer comes into the laboratory to take part in a certain experiment, and that the experimenter carefully explains to him what he is to do. The next day he comes again, and the explanation is repeated. The next day he comes again; this time the experimenter says nothing; the experiment just goes on in the usual way; and so on the following days. Suppose, however, that on the twentieth day the experimenter says: 'Are you thinking about what I told you to do?' The observer, fearing that

he has done wrong, and feeling very repentant, says: 'No! to tell the truth I had forgotten all about it; it had absolutely gone out of my mind; have I been making mistakes?' He had not made any mistake; but his reply shows that a certain tendency, impressed upon his nervous system by the experimenter's original explanation, had been effective to direct his ideas long after the idea of the explanation itself had disappeared. And what happens here, in a few days' work in the laboratory, is happening every day of our lives in the wider experience outside of the laboratory.

We see, therefore, that there is nothing spontaneous or active about secondary attention. It is merely primary attention over again, but *primary attention under difficulties;* it is a direct consequence of the multiplication of perceptions and ideas, and of the complexity of the nervous system.

(3) *Derived primary attention.* — One of the strongest proofs that there is no real difference between primary and secondary attention is that, in course of time, these difficulties vanish. Habit, as we say, becomes second nature; the thoughts that at first moved haltingly and with all sorts of interruption gradually become absorbing; work that was once done with pains and labour grows fascinating, and makes an unquestioned demand upon us. So the period of struggle ends, and *we slip back again into primary attention; only this derived form is controlled, not by the great biological stimuli, but by impressions that fit in with our acquired interests.* The collector, the inventor, the expert are roused to keen attention by stimuli which the rest of the world pass with-

out special notice. Most of the striking coincidences of life are accounted for by this law; you are thinking about certain things, and something happens that, because you are thus thinking and because it is akin to the subject of your thought, captures your attention. 'What an amazing coincidence!' you cry; but if you had been occupied with some other topic, there would have been no coincidence. The man in Mr. Kipling's story who wondered, years after the event, 'how in the world he could have written such good stuff as that', had written under this same law of attention; for when you are thoroughly absorbed in a subject, relevant facts and ideas crowd upon you; the mind stands open to them, while it is fast locked against the irrelevant; and you surpass yourself. There is, to be sure, another side to the picture; the enthusiastic adoption of a belief or theory throws into brilliant relief all the facts that tell in its favour, but blinds you to the considerations that make against it.

In sum, then, **attention appears in the human mind at three stages of development**: as primary attention, determined by any stimulus that is biologically powerful; as secondary attention, during which a perception or idea dominates the mind in face of opposition; and as derived primary attention, when this perception or idea has gained practically undisputed ascendency over its rivals. Looking at life in the large, we may say that the period of training or education is a period of secondary attention, and that the following period of mastery and achievement is a period of derived primary attention. Looking at experience more in detail, we see that edu-

cation itself consists, psychologically, in an alternation of the two attentions; habit is made the basis of further acquisition, and acquisition, gained with effort, passes in its turn into habit; the cycle recurs, so long as the nervous system remains plastic. Secondary attention thus appears as a stage of transition, of conflict, of waste of nervous energy, though it appears also as the necessary preliminary to a stage of real knowledge. Meanwhile and all the while there is no escape from interruption by the original primary attention; but the interruptions grow less and less disturbing as civilisation proceeds.

§ 21. **The Nature of Attention.** — Our next task, in the words of p. 93, is to *trace the pattern of attention*, to describe as accurately as possible the arrangement of our vivid and obscure sensations. Notice that, in popular parlance, attention covers only the vivid processes of the moment; psychologically, however, the term includes both the vivid and the obscure, those that we are 'distracted from' as well as those that we are 'attending to.' This being understood, we may attempt a description.

It seems that, *in most cases, the state of attention is* **twofold** *and only twofold.* There is a cluster of sensations at the centre, all of approximately the same vividness, and there is a mass of sensations in the background, all of approximately the same obscurity. Suppose that you are looking at one of the puzzle-pictures that are published in certain magazines, — trying to find a face outlined in the branches of a tree. At first, the whole picture is vivid, and the rest of your experience is obscure.

Suddenly you find what you are seeking; and what happens? In all likelihood, the picture drops with a jerk into the general dimness of the background, while the face that you have discovered stands out by itself in all imaginable vividness; you forget the picture, and see nothing but the face. The state of attention, then, in this its usual form, may be represented by two concentric circles; a small inner circle stands for the focus of attention, a large outer circle circumscribes its margin. There is experimental evidence that, when our sensations are thus arranged, their vividness and obscurity are, as the arithmetics say, inversely proportional; *the more vivid the central processes, the more obscure are the marginal;* or, in untechnical language, the more we are concentrated upon any one thing, the less liable are we to distraction by other things. This twofold arrangement seems to be, for most of us, the regular pattern of attention; but certain observations in the laboratory, which are borne out by statements in various text-books of psychology, make it practically certain that *there is another, less frequent and more complicated type of arrangement.* Here the picture does not drop clear down into the background, when the face is found, but remains poised somewhere between focal vividness and marginal obscurity; so that three degrees of vividness — sometimes even four have been reported — may be distinguished in one and the same state of attention. In such cases, attention must be represented by three or four concentric circles; the inner and the outer still show the focus and margin of the total state; the others indicate that there are sensations present whose vividness

lies somewhere between those extremes. Whether the focal processes suffer from the rivalry of the moderately vivid sensations; whether, that is, attention in its threefold or fourfold pattern is necessarily, even at the best, of a lower degree than the best attention of the twofold kind, we do not know.

Our description of attention is so far complete; but there are two further questions that naturally occur. Do we not attend to what 'interests' us? In that case, however, attention must imply feeling. And is not sustained attention tiring? In that case, attention would seem to imply muscular sensation. These are undoubtedly points to be considered, and we must try to get at the facts. *Are feeling and kinæsthesis necessary in attention*, or are they merely chance accompaniments of the attentive state?

It all depends upon the stage of development at which attention appears. At first, in **primary attention**, the organism *perceived* the strong or sudden or novel or moving thing, as sight or sound or touch, and also *felt* it, as disturbing or startling or surprising; attention implied a sense-feeling. At the same time, the organism *took up an attitude* to the stimulus, in the literal sense; faced it, as peering and listening and frightened animals face such stimuli to-day. At this stage, then, *the shift of vividness is always accompanied both by feeling and by sensations*, — sensations due to internal bodily changes and to muscular attitude. Then comes **secondary attention**, with its conflict between various claimants for the inner circle of attention; and the conflicting stimuli will, naturally, arouse a medley of sense-feelings

and set up a struggle of more or less incompatible motor attitudes. In civilised man, the scene of the conflict has been largely transferred from perception to idea; but *the effort that we make when we apply ourselves to a task, the difficulty that we have in settling down, the fatigue that results from sustained work upon a difficult theme,* all these things are reminders of the general uneasiness and restlessness that characterise secondary attention at the perceptive level. Only when we come to **derived primary attention** do feeling and kinæsthesis cease to be necessary factors in the attentive state. What we call mechanical, habitual, expert, professional attention means extremely vivid experience; but it *need not involve either feeling or kinæsthetic sensation.* Attention is no longer turbid with organic processes; the stream of mind has cleared itself. Common sense would say, and rightly, that a cool and critical poise has replaced the older animal excitement, and would emphasize the value of this change. We do not question the value; but we are at the end of our psychological enquiry when we have shown what the change in experience actually is, and how it is brought about.

But are we at the end? Should we not say something about **inattention**, which in everyday life we take to be the opposite of attention? have we not still to describe the inattentive state? No: *in the normal waking life there is, in strictness, no such thing as inattention.* We give that name to an attention which is directed upon what we regard as an improper object. The inattentive person is merely attending to something else; the pattern remains the same. It is possible that, in certain

abnormal cases, all mental processes alike run their course in relative obscurity; but even here we are not dealing with inattention; there is some weakness or obstruction of nerve-forces, which prevents sensations from reaching their full normal vividness.

§ 22. **The Experimental Study of Attention.** — The question of the **range** of attention, — how many sensations or images may occupy the focus at the same time, — was canvassed in the Middle Ages: witness our quotation from St. Thomas. The first appeal to experiment seems to have been made, in the late thirties of the past century, by the Scottish philosopher Sir Wm. Hamilton. "You can easily make the experiment for yourselves," Hamilton tells his students, "but you must beware of grouping the objects into classes. If you throw a handful of marbles on the floor, you will find it difficult to view at once more than six, or seven at most, without confusion; but if you group them into twos, or threes, or fives, you can comprehend as many groups as you can units." The experiment is not very rigorous; but more accurate work on the subject shows that Hamilton was not far wrong. *If a field of simple visual stimuli is shown for a brief time, the practised observer is in fact able to grasp six of them;* and if familiar groups are substituted for the separate stimuli (short words for letters, or playing-card fives for single dots), the range of visual attention remains the same.

In this case the stimuli are presented together in space; they may also be presented in time. If you listen to a metronome beating, say, 15 in the minute, you will be

able with practice to hold *six successive strokes* in the focus of attention, but not more; if you try to group the seventh stroke with the preceding six you become confused; the series breaks, and cannot be welded together again. As the speed of the metronome is increased, the beats fall of themselves into groups of twos and threes; and you can still grasp and hold six of these rhythmical impressions. When the speed has reached some 200 in the minute, the rhythmical grouping becomes more complicated; as many as eight single beats may be bound together in a rhythmical unit; and the attention is adequate, again after practice, to five of these complex groups; the focus comprises no less than forty separate strokes of the pendulum. *This result, we may note, agrees very well with the canons of musical and poetic composition.* The musical phrase never contains more than six measures, and the poetical line or verse never contains more than six feet; a seven-measured phrase or a seven-footed line falls to pieces, ceases to be unitary. The rhythmical wholes of a higher order, the period in music and the stanza or strophe in poetry, never contain more than five phrases or verses; as a rule, neither contains more than four.

So much for range; we turn to consider **duration**; how long can a sensation maintain itself at the focus? how long can we attend to a single simple impression? The early experiments on this question were most ingenious. The observer was required to look steadily at a little disc of very light grey, shown against a white background, or to listen intently to the very faint sound of a stream of fine sand; and the theory was that, since

these stimuli were barely distinguishable at the outset, any lapse of attention, any decline in the vividness of the sensations, would blot them out altogether; they would disappear. The sensations did disappear, after a few seconds; and then, after another few seconds, came back; and so the conclusion was drawn that attention fluctuates, that we can attend to a single simple impression only for a few seconds at a time. No doubt attention fluctuates; but these experiments, unfortunately, are not to the point; for the disappearance and reappearance of the sensations can be accounted for by changes in the sense-organ, by adaptation, by twitching of the eyes, and so on. Other experiments have therefore been suggested. If we have recourse to smell and touch, we find that the course of adaptation to an odour, or to the pressure of a small weight laid upon the skin, may be followed attentively, without noticeable fluctuation, for two or three minutes; and the observers report that they could have kept up their attention still longer. Again, however, objection may be raised; for as adaptation advances, the sensation grows fainter and fainter; and the attention is thus continually spurred to hold it; the observer is not attending to an unchanging process, but is sharpening his attention to something that becomes more and more difficult to fix. Here we are, for the present, at a standstill. *There is no doubt that attention fluctuates;* the bare fact is plain enough in our everyday experience; but we have no experimental ground for a more definite statement.

Experiments have also been made to determine the **bodily changes** which occur in the state of secondary

attention (p. 102). It is found that the volume of the brain increases, while the volume of the arm (save in experiments in which tactual stimuli are employed) decreases. Breathing becomes shallower; and expiration becomes relatively longer as compared with inspiration, so that the quotient $I : E$, time of inspiration divided by time of expiration, becomes less. There are changes in the rate of pulse; but they seem to differ according as the attention is 'sensory' or 'intellectual,' — according, that is, as the focal process is a sensation or something more complicated, a perception or idea: in sensory attention the pulse beats more slowly, in intellectual attention more quickly, than its normal rate. It is natural that the blood, in attention, should be drawn from the members to the brain; it is natural, too, that this rule should be broken when a limb is itself the 'object' of attention; and we all know that there is a tendency, when we are attentive, to hold the breath; so that the changes of volume and breathing are not surprising. Nothing more can be said at present of the changes in rate of pulse.

§ 23. **The Nervous Correlate of Attention.** — It remains to say a word about the nature of the nerve-forces (§ 20) which underlie attention. Physiologists tell us that one nervous process may influence another in two opposite ways: by helping and by hindering, or, in technical terms, by **reinforcement** and **inhibition**. Let us take an elementary example of what they mean. Suppose that a frog has been reduced, by the removal of its cerebral hemispheres, to a mere nerve-and-muscle

machine; it lives, but it cannot sense or feel, and it does not move 'of its own accord.' If, now, a weak pressure is applied to the frog's hind foot, there is no visible response; the limb remains passive. But if at the same moment a light is flashed into the eye, the leg-muscles may be thrown into strong contraction. Here we must suppose that the two nervous processes, from skin and eye, have in some way helped each other; there is nervous reinforcement. If, again, a pressure is applied to a certain part of the frog's body, the animal croaks. If a strong pressure is applied to another part of the body, it replies by a contraction of the muscles. If, however, the two pressures are applied together, the frog does not both croak and move; it does neither; there is no response to the stimuli. Here, therefore, we must suppose that the two nervous processes interfere with each other; there is nervous inhibition.

It seems plain that these two influences are at work among the nervous processes correlated with attention. *The vivid sensations at the focus are sensations whose corresponding nervous processes have been reinforced, and the dim sensations of the background are sensations whose corresponding nervous processes have been inhibited.* No doubt, the distribution of these forces, in a given instance, is really a matter of *degree;* the reinforced nervous process receives more reinforcement than inhibition, and conversely. No doubt, also, the *removal* of an existing inhibition may produce the same effect as the addition of a reinforcement, and conversely. We are still too much in the dark as regards the intimate char-

acter of the nerve-forces, we know too little of their actual course as nervous function in nervous structure, to be able properly to distinguish cases. There is evidence that *inhibition* may be extraordinarily effective: thus the late Dr. W. B. Carpenter relates that he "has frequently begun a lecture, whilst suffering neuralgic pain so severe as to make him apprehend that he would find it impossible to proceed; yet no sooner has he, by a determined effort, fairly launched himself into the stream of thought, than he has found himself continuously borne along without the least distraction, until the end has come, and the attention has been released; when the pain has recurred with a force that has overmastered all resistance, making him wonder how he could ever have ceased to feel it." *Reinforcement* also may be carried to a high degree: how else could the listener follow the part assigned to some special group of instruments in the orchestra, while he still hears the full harmony? and how, still more, could the conductor single out the particular violin-player, who has mistaken a note, from the group of sixteen who are all playing precisely the same part?

We may suppose, therefore, that *one and the same pattern of attention is due to very varied combinations of reinforcing and inhibiting nerve-forces.* How then shall we account for the fact that, in any given instance, vividness and obscurity are inversely proportional (p. 100)? The reason seems to be — though we could not have learned it from the experiments on the frog — that a reinforcement and a corresponding inhibition always go hand in hand; you cannot reinforce one

process without at the same time inhibiting others, and you cannot inhibit without reinforcing. *The nerve-forces are thus interlinked or, as we might say, double-acting.* We are struck by the inhibition in Carpenter's case; but the case has another side; for the more successful the inhibition of the neuralgia, the better was the lecture delivered. So we are struck by the reinforcement in the case of the conductor; but that, too, has another side; for the keener his attention to the music, the more oblivious is he of his other surroundings. We shall come back later to this notion of the interlinking of the nerve-forces, and shall indicate the evidence upon which it rests.

In summary, we may repeat our general statement that *vividness is paralleled by nervous reinforcement, and obscurity by nervous inhibition.* Only we must realise that the processes actually going on in the brain may be very complicated; many separate forces may be at work behind the single mental pattern, and their action may be brought about in different ways; and we must remember also that every one of these separate forces is double-faced, reinforcing and inhibiting at the same time.

Questions and Exercises

(1) "So numerous and varied are the ramifications of attention, that we find it defined by competent authorities as a state of muscular contraction and adaptation, as a pure mental activity, as an emotion or feeling, and as a change in the clearness of ideas. Each of the definitions can be justified from the facts, if we put the chief emphasis now upon one phase and now upon another of its varied expressions" (W. B. Pillsbury, Attention, 1908, 1). Discuss this passage.

(2) Give instances, from your own experience, of the three levels of attention. Trace the development (still from your own experience) of derived primary from secondary attention.

(3) Describe carefully the attitudes (*a*) of the scout (secondary visual attention) and (*b*) of the eavesdropper (secondary auditory attention). How do you account for their difference?

(4) A child that has fallen and hurt itself stops crying if you offer it a toy; a soldier who in the heat of battle has received a serious wound may know nothing of it, and may go on fighting till he drops from exhaustion; many a martyr has suffered at the stake with calm serenity. How far are these cases explicable by the laws of attention?

(5) Criticise Sir Wm. Hamilton's experiment. Do not be satisfied till you have found several reasons for distrusting its result.

(6) Do the lower animals ever give evidence of derived primary attention?

(7) You can follow the movement of a single instrument in the orchestra better, when it has been playing a solo before, than when the whole group of instruments begin together. Why is this? Give other instances of the same law.

(8) It has been proposed to measure the degree of attention by measuring the degree of effort which accompanies it. What have you to say to the proposal?

(9) How could you tell, by outward observation, whether

a child is attentive or inattentive? and whether it is adequate to its task or is in difficulties? Do not just list the symptoms; make your answer psychological.

(10) Determine the range of attention (*a*) by help of an ordinary metronome, set at various rates. You must not count the beats, since every count would mean a separate attention. Determine the range also (*b*) by help of the letter-diagram and cardboard screen figured by W. Wundt, An Introduction to Psychology, 1912, 19. Notice the remark (p. 23) that the experimenter must practise covering and uncovering the diagram.

(11) Paint or paste a small disc of light grey on a white cardboard ground. Move so far away that the spot is only just distinguishable. Call out Gone! and Back! as it disappears and reappears, and have the times noted on the seconds-dial of a watch. Explain the fluctuation, in your own words, as due to adaptation and eye-movement. Can you devise a simple method of showing (by means of the negative after-image) that unnoticed eye-movements really occur?

(12) St. Thomas asks whether the mind can grasp more than one thing at a time; and replies that it can, if the various things are regarded as making up a single whole, but that it cannot, if they are regarded in their variety and particularity. Can you put all this into psychological language? And can you find any difference between St. Thomas' question and our own question as to the range of attention?

References

Sir W. Hamilton, Lectures on Metaphysics, i., 1859, 254; W. B. Carpenter, Principles of Mental Physiology, 1888, ch. iii.; W. James, Principles of Psychology, i., 1890, ch. xi.; W. Wundt, Lectures on Human and Animal Psychology, 1896, Lect. xvii.; Outlines of Psychology, 1907, § 15; W. B. Pillsbury, Attention, 1908; E. B. Titchener, Lectures on the Elementary Psychology of Feeling and Attention, 1908, Lects. v.–viii.; Text-book of Psychology, 1910, 265 ff.

CHAPTER V

Perception and Idea

If we cross the fingers, a single object beneath them appears to be two; and yet we do not say that there are two, for sight is more decisive than touch; but if touch were our only sense, our judgment would declare that the single object is two. — Aristotle

§ 24. **The Problem in General.** — The chapters on the mental elements — sensation, simple image, feeling — have made you acquainted with the *results* of psychological analysis; it was only occasionally that you were asked to analyse for yourself. Henceforth we shall be dealing with experiences that offer themselves *for* analysis; with experiences that, however simple they may at first sight appear, turn out on investigation to be complex. We shall thus be following the example of those men who, long centuries ago, tried to bring order into mental phenomena and to establish a science of mind. We have an enormous advantage; for they were working in the dark, and we are working in the light of their discoveries. Still, our procedure will be the same as theirs; and the change of work brings with it certain difficulties that you must realise at the outset and be ready to face. Well begun is half done.

First of all, then, your reading henceforth will be more difficult, because you will have to *keep more things in mind*. The analysis even of so comparatively simple

a thing as a perception or idea cannot be performed in one breath. A knot in a rope may be beautifully simple, and yet you may spend a week in learning it! Secondly, the *examples* chosen by the author may not be just the right examples for you; even perceptions and ideas, again, differ a good deal in different minds; and an example that is illuminating to one reader may leave another quite blind. So you must look for your own examples in your own experience. Thirdly, you have now to wrestle with the problem of *meaning* (p. 26); for all perceptions and ideas, and all our still more complicated experiences, mean something; a perception is always the perception *of* a tree or a wedding or what not; and an idea too is always the idea *of* something, whether of the landing of Columbus or of the quarrels of the gods in Homer. You must get clear, then, about the psychology of meaning. Fourthly, these concrete experiences that you are to analyse have a long *history;* and in seeking their nervous correlates we shall be obliged, oftentimes, to go far back, even beyond the individual, to the development of the race. In doing this we do not change the problem of psychology (p. 18), but we enlarge our view of it; a mere reference to the organ of sense or the present condition of the nervous system is no longer enough.

All this means, in summary, that we are passing from the abstract to the concrete, from the meaningless to the meaningful, from the simple to the complex. We still keep to our scientific point of view, and we still employ our scientific method. The change is not in us, who are psychologising, but in our subject-matter;

the plot begins to thicken; and this growing complexity of subject-matter naturally makes increasing demand upon our scientific resources.

§ 25. **The Analysis of Perception and Idea.** — Sensations and simple images can hardly occur, by themselves alone, in our everyday experience. The practised psychologist may be able to focalise a sensation, to make it so vivid that it stands out almost as it would under the experimental control of the laboratory; but his is an exceptional case. The units of our daily experience are rather such things as the sound of the piano in the next room, the sight of the tree budding just outside the window, the memory of last winter's snow-piles, the forecast of to-night's Pathetic Symphony; that is, they are *perceptions* and *ideas*. Notice that they come to us in the first place as units, as wholes; they show no lines of natural cleavage; they are unitary and self-contained. Yet they are not psychologically simple; if they were, we should never have lit upon sensations and simple images. *All perceptions and ideas may be analysed.*

A typical **perception** *resolves, to begin with, into a number of sensations.* The sound of the piano is, after all, the sound of certain compound tones, played together and in succession; and the sight of the tree is an arrangement of colours. The characteristic part of a perception, then, the part that we may conveniently call its core or nucleus, may thus be analysed into sensations. Only the core, however; for *the sensations are supplemented, secondly, by various images.* The sound

comes to us as the sound of *the* piano, the instrument of that familiar look; and we may have an imaginal hint of the child playing, of the score, of its special difficulties, of all sorts of related things. The tree, too, is *that* tree, the familiar cherry that the caterpillars infest so badly, that grew so much last year, that will presently cut off the view across the street, that very likely will interfere with the beech. Remember that these are the author's instances, and that you must replace them by your own! The point is that the complement of images is there; and you will notice that it is not stable; it may be full or scant, and it may lead the mind this way or that; but, whatever it be, it puts more into the perception than the sensory stimuli can account for; we perceive more than we hear or see.

Yes, and we perceive more than is furnished us by sensations and images. It is a fact (which you will better understand presently) that *every perception is shaped and moulded by the action of nerve-forces which show themselves neither in sensation nor in image.* The nervous system, whether by racial heritage or by individual habit, meets its impressions halfway, and throws them into certain customary forms. We take both the tree and the piano to be real things, and we take them to be things that occupy real space; we perceive them as objects of the outside world, and we perceive them as solid or space-filling. We do this because we have a natural and ingrained tendency to cast our perceptions into the forms of 'thing' and 'space'; and this tendency of the nervous system does its work automatically;

it has no correlate of sensation or image; but it is none the less effective, so to say, *behind* the sensations and the images, in determining the perception. You must just accept this statement now; it will become clearer later on.

A typical **idea**, in the same way, *has a core or nucleus of images*. Last winter's snow may come to us in many different ways, because our equipment of images is very variable (pp. 75f.); it will come to most, perhaps, as a visual picture, an uneven spread of white, with streaks of grey-brown on the peaks and along the valleys, honeycombed and broken from some partial thaw. To-night's music will come, possibly, as the sound of the opening adagio measures, or of some theme from the allegro. Here again, however, the nucleus has its surroundings; *other images cluster about it;* we recall the day so-and-so got his feet wet, or the big fall of that December Thursday; we see our place in the concert-hall, or hope that this time the tympani will be in tune. *Nor is the idea altogether a matter of images.* We can hardly think of those opening measures without kinæsthetic sensations from the throat, or from some muscular beat of the rhythm; we can hardly think of getting our feet wet, or of seating ourselves in the hall, without some actual movement that arouses sensation. Find your own instances, once more, and do not trust the author! You will find that *the typical idea is thus in part sensation, just as the typical perception is in part image.* Finally, the idea, too, is subject to the pressure of the *directive nerve-forces;* it takes the same customary forms as the perception.

Columbus is thought of as a real person, acting in a real world of space and time; and Zeus as an imaginary person in an imaginary world; but there is no difference in the form of the ideas, and no difference of form between these ideas and the perception of the stranger who has just passed the window.

So we have *the characteristic nucleus; the varying complement; and the brain-habit behind all.* And if we can analyse the perception or idea, nucleus and surroundings both, into its mental elements; if we can say what nervous processes are correlated with these elementary mental processes; and if we can further establish the nature of the guiding and shaping nerve-forces; then our psychological account will be, in strictness, complete. Yet we shall have passed over something that, as we have ourselves admitted, is in everyday life most strikingly characteristic of these experiences; the fact, namely, that they **mean**; that our perception of the tree means the tree, is a perception *of* that tree, and our idea of snow means the snow, is an idea *of* that snow. *What, then, from the psychological point of view, is this meaning?*

§ 26. **Meaning in Perception and Idea.** — We learned in § 6 that mental processes are not intrinsically meaningful, that meaning is not a constituent part of their nature. We have seen, indeed, that the whole notion of meaning is really foreign to science. When we ask, then, what meaning is, from the psychological point of view, are we not asking an irrelevant and unscientific question?

Not necessarily. A science cannot free itself, offhand, from its own history; and, historically, psychology has been much concerned with meaning. Moreover, meaning is of very great practical importance; we communicate meanings, we apprehend meanings, we act upon meanings; and although science is not bound to treat only of what is practically important, yet it can hardly neglect a matter of great practical importance that comes its way. Our question, if we rephrase it a little, merely asks *that a term, familiar to us in our daily life, be translated into the language of science;* and if the translation out of common sense into science is to be made at all, psychology is the science in which the equivalent of meaning will be found. For these reasons we are justified in discussing the matter here; and the question at issue — let us be quite clear about it — is this: What mental processes, in perception and idea, are the scientific equivalent of what we know in everyday life as meaning? *what processes carry the meaning?*

The answer is that the processes which surround the nucleus carry the meaning. *Psychologically regarded, meaning is always context;* and the context is the fringe of related processes that gathers about the central group of sensations or images. Ordinarily, as our analysis has shown, the two come together; but they may be disjoined. When the word ' house ' becomes meaningless with repetition (p. 26), it is because the bare sound grows more and more vivid and dominant; like the nestling cuckoo, it drives out its normal associates; and these associates, the carriers of its meaning, sink lower

and lower into the obscurity of the background. So the meaning, almost literally, drops off, falls away. When one and the same experience has different meanings, it is because the context varies; we read, for instance, that so-and-so received a warm welcome, and we put directly opposite interpretations on the words, according as so-and-so was friend or enemy. When we mistake a meaning, it is because we supply a context of our own: what child, reading that "the quality of mercy is not strain'd," has not thought of mercy being wrung out through a strainer, as the cook wrings the water out of cottage-cheese in a muslin bag? The context of images is obvious; the rain falls freely, like water poured through a sieve; but what is *strained* comes out grudgingly in drops. When one and the same meaning attaches to several experiences, it is because these different experiences are received into the same context, or into a context so nearly the same that for practical purposes the differences disappear; for example, the experiences may be named, that is, may be received into a context of verbal ideas; and verbal ideas tend to become stereotyped, as it were, into permanent groups. All the facts of § 6 are to be accounted for in this way, by the distinction of nucleus and context.

Originally, we must suppose, meaning was carried exclusively by kinæsthetic and organic sensations. Think of the animal that we pictured on p. 101 as startled by some sudden stimulus and as facing the stimulus by way of a bodily attitude; the sensation is hemmed in, like a jewel in its setting, by the sensations of organic stir

and motor posture; and these sensations give the meaning; they cry out 'Danger!'; they are the psychological equivalent, the carriers, of that meaning; without them the sensation would be meaningless. *Meaning is thus older than the free image;* and kinæsthesis is still, for many of us, the characteristic context, the common denominator of our meanings; we hinted at this rôle on p. 47. None the less, the development of free images, the images of memory and imagination, changes the whole situation; kinæsthesis now has many rivals; and it depends on our individual equipment of images, on our 'type of mind,' whether a meaning shall be carried by a quiver of the stomach or some muscular set, or whether it shall be carried by some complex of images. If we were to work out a great number of cases, we should probably find that *any sensory or imaginal process whatsoever is able, in our adult human experience, to carry the meaning of any other.*

There is yet a further stage: a stage in which *meaning is carried not by any sort of sensation or image, but simply and solely by physiological processes,* by some set or disposition of the brain. When the practised reader skims a number of pages in quick succession; when the musician renders a composition in the prescribed key; when an accomplished linguist shifts from one language to another as he turns to his right or left hand neighbour at a dinner table; in cases of this kind there need be no discoverable context; the stimuli press the button, and the brain, prepared by constant practice in the past, now does the rest. The experiences *mean,* positively enough; the 'sense' of the pages is grasped, as

the eye hurries over the lines; the three flats on the staff set the player's hand and eye for the key of E♭; the question put in French is suitably answered in the same language; everything takes place *as if* there were a fringe of images that gave meaning to the bare perceptions; and yet imaginal fringe and kinæsthetic setting may be conspicuous only by their absence. Of course, there *has been* context; one does not learn French and German, or transpose on the piano, by gift of a ready-made nervous system; even after years of work one may be a little uncertain of the German auxiliaries, or have a repugnance to four sharps. The point is, however, that an habitual and often-repeated context does, presently, lapse altogether; the nucleus is not always supplemented; the nervous system can now do, by a set or disposition that has no mental correlate, what it used to do by processes that had as accompaniment the sensations or images of the context.

It is plain, therefore, that *perception and idea are not always so rich and complicated as we have described them;* we spoke, for that very reason, of the 'typical' perception and idea. They range, according to their age and use, from the cluster of nuclear processes surrounded by a group of contextual associates, all under the guidance of a directive nerve-force, down to a mere rag and tag of sensory or imaginal process, wholly bare of associates, and dependent for its meaning upon some habitual nervous set.

§ 27. **The Types of Perception.** — Our perceptions are based upon three of the attributes or aspects of sen-

sation: upon quality, upon duration, and upon extension (p. 66).

The **quality** of sensation has already been discussed. We may take, as instances of qualitative perception, the taste of coffee, the resistance of a jammed door, and the note of a musical instrument. The *taste of coffee* analyses into sensations of bitter, the real taste of the coffee-berry; of warmth; of pressure, the feel of the liquid in the mouth; and of a peculiar fragrance, the odour of coffee. Along with these goes a colour, the clear or clouded brown of the coffee in the cup, and various other contextual processes. The *resistance* analyses into the qualities of pressure from the skin; of strain from the tendons of the arm; and of pressure, or something akin to pressure, from the binding of the joints and the contraction of the muscles. There is probably some organic stir; there is the sight of the door; and there may be a further context. The *musical note* analyses into fundamental tone and overtones, and into the noise characteristic of the instrument; the thud of the piano, the scrape of the violin, the pluck of the harp. The supplement is perhaps visual; but here, as in the other cases, verbal ideas may enter into the context; we may think 'Violin, of course.' All our qualitative perceptions are of this kind; they come to us as meaningful wholes, and they may be analysed into a number of sensory qualities, run or fused or blended together, and set in various contexts of associated processes.

The attribute of **duration** has not yet been defined. It is the bare going on, going forward, keeping like

itself, that may be observed in any and every sensation; you recognise it most easily, perhaps, if you listen to a tone, or attend to the kinæsthetic complex as you slowly extend your arm from the elbow. It is *the elementary time-factor in all our perceptions of time*, — in the perceptions of period, of interval, of rate, of rhythm, and so on; though in some of these perceptions it is overlaid and obscured by other factors. Qualitative perceptions undergo relatively little change, just because they are qualitative perceptions; the best and easiest way to *mean* a quality is to *be* it; the best way to mean the coffee-taste is to be the coffee-taste; and so our perception of that taste remains practically the same all our life long. Time-perceptions, on the other hand, — and the same thing is true of space-perceptions, — change enormously; the nervous system finds all manner of short-cuts to the meaning of time; and these short-cuts have to be *un*practised, to be practised out, if we are to observe the perception in its original form. Thus, to take the simplest case, a period of time may seem long because the kinæsthetic strain of waiting becomes intense, or because a great number of perceptions and ideas occur during its course; the strain and the number of ideas have come to *mean* length of time, and the primary experience of duration, so to say, drops out of sight. If, therefore, we wish our observers in the laboratory to compare periods of time; if we wish to find out accurately what durations can be grasped by the attention and held in the memory; then we must break them of these time-habits, and must somehow train them to disregard strain and to discard imagery.

We cannot often carry the unravelling of a perception to the very end, though we can go some distance behind the appearances of everyday life.

The attribute of **extension** is the bare character of patch or spread that inheres in all sensations from eye and skin, and possibly also in kinæsthetic and organic sensations. No point of light or pressure is so fine that it is not areal. Extension is *the elementary space-factor in all our perceptions of space.* It enters most obviously into the perception of surface, as duration enters most obviously into that of period; but it is the basis also of our perceptions of form, size, distance, locality, direction. Like duration, it is often obscured and overlaid by other factors.

Here, however, you will raise an objection. Have we not said, on p. 115, that perception is shaped and moulded by nerve-forces that have no mental correlates? and did we not take as an example the casting of perceptions into the forms of 'thing' and 'space'? How, then, can we now speak of perceptions *of* space? — Well, for one thing, there are various kinds of spatial perception; and it will not do to assume that they are all alike a matter of brain-habit, without mental correlate. Secondly, however, there is a difference between perceiving the piano or the tree *as* spatial, and turning our attention directly upon its spatial characters, its size or form, its distance or direction. In the latter case, we may rightly speak of a perception of space; we may so speak, even if the various kinds of spatial perception do turn out to be matters of brain-habit; and we must examine every kind for itself, precisely in

order to determine how far it is sensory and imaginal, and how far it is a form impressed on sensations and images by the trend of the processes in the brain.

So the objection is answered. Coming back to the subject, we note that some of our more **complex perceptions** have a twofold basis: thus the perception of melody is at once qualitative and temporal, and the perception of movement is at once temporal and spatial. Nay more, the perception of a scene, a situation, an event, is threefold: qualitative, temporal and spatial; think of a scene of grand opera, or of an accident on the street. In general, the analysis of these complex perceptions follows from that of the simpler modes, though every one of them has its own psychological problem.

It may seem strange that we have not distinguished a group of perceptions based upon sensory **intensity**. The fact is, however, that while intensity enters into all sorts of perceptions (lemonade must not be too sour, the members of a rhythm must be variously accented, a distant sound is faint), it only rarely characterises a perception; and when it does, the perception thus characterised belongs to one or other of the groups already mentioned. We say 'What a heavy child!' — but the perception of weight, like that of resistance, is itself qualitative. Or we say of a certain composer 'He always overdoes the drums!' — but the drum-rhythm is itself a temporal perception. *We cannot point, then, to a separate class of intensive perceptions.*

§ 28. **The Perception of Distance.** — A complete psychology of perception would contain an analytical

treatment, up to the limits of our present knowledge, of all the various perceptions, qualitative, temporal and spatial, as well as complex, that occur in experience. Such a treatment is here out of the question. We must pick and choose; and as a sample of perception at large we shall consider the *perception of distance*. We seem, quite immediately and directly, to *see* distances; we see that our friend is coming nearer, we see that he has passed the bridge, we see that he is entering the gate, we see when to shake hands with him. Yet there is no sensation of distance, and there is no specific stimulus to distance. What, then, really happens?

In the first place, there are plenty of **visual cues** to distance. We take familiar things to be far off if they look small, and near by if they look large; the size of the men and vehicles in the street makes us realise the height of the building we are gazing down from. We take things to be far off, again, if they are hazy and bluish, near by if they are clearly outlined and varied in colour; everyone knows or has read of the deceptive nearness of distant mountains in clear dry air. We notice the distribution of light and shade; a morning or evening landscape, a shaded face or sphere, looks deeper, more solid, more plastic, than the landscape at high noon or the outline drawing. We notice the course of boundary lines and the visibility of surfaces; that is nearer which cuts across the rest or blots part of it out; the telephone wire is thus nearer than the elm, and the elm is nearer than the house. We notice the number of objects that the eye must traverse to arrive at its goal; and the more numerous the objects, the farther off do we take

the goal to be; the town looks near, we say, but there are all those fields, and the wood, and the churchyard, and half-a-dozen farmhouses to pass, and then the outlying houses; it must be a good two miles. We get various hints from movement; a crawling train or car is far away; and if we are looking at a near object and move the head to one side, distant objects move in the same direction, while if we are looking at a far object and move the head, near objects go in the opposite direction; and so on. *All these things — linear perspective, aerial perspective, chiaroscuro, interposition, number, movement — are, however, secondary affairs;* they represent short-cuts to the meaning of distance (p. 123); they do not lead us to the perception of distance itself. At the same time, we should bear in mind that these secondary processes were there, ready to take up the burden of meaning, all the while that the perception was forming.

Having thus cleared the ground, we naturally appeal to experiment; but unfortunately the first step that we take lands us in difficulties. It is found that, when all the cues above mentioned are ruled out, the estimation of distance is still possible; and many psychologists believe that it depends upon **kinæsthetic sensations** set up in and about the eye. Each eyeball is slung in its orbit upon six muscles; and the contraction of these muscles is, naturally, greater for convergence of the eyes upon near objects than for their convergence upon far; so that the *sensations of convergence* seem fitted to play a part in the perception of distance. If only one eye is used, these sensations may be replaced by others, derived from the muscular system, within the eyeball,

that adjusts or accommodates the lens for clear vision at different objective distances. The *sensations of accommodation*, though in ordinary binocular vision they are entirely subordinate to the sensations of convergence, can nevertheless — within a lesser range of distances — play the same part in perception. Unfortunately, as was hinted just now, the results of these experiments are disputed; we shall come back to them, and to the possible rôle of the kinæsthetic sensations, later on.

Meantime, what is to be said of the **eyes** themselves, and of the impression that a solid object, a tridimensional stimulus, makes upon them? If you hold up a closed book, back towards you, in the middle line of the face, and if you observe it alternately with the right and left eye, you will find that the two views do not tally; the left eye sees the back and the cover to the left, the right eye sees the back and the cover to the right. If you now make outline drawings of the two views, mount them upon a suitable card, and look at them through a **stereoscope**, — which, as you know, combines them into a single view, — lo! you have before you a solid book, the back near you, and the edges away in space. *It is as if the two eyes had reconciled their conflicting views, and the result were depth or solidity.*

But is not this the very thing we were in search of? have we not at last got at the secret of visible depth? No; we are rather *at the crucial point of our discussion.* For this binocular picture, the image seen in the stereoscope, cannot be, of its own nature and in its own right, deep or solid, unless there is a depth-sensation; and that

conclusion goes against everything that we know both of sensation and of the stimuli that arouse sensation. To avoid it, some psychologists call in the kinæsthetic sensations from the muscles of the eye. *Depth or distance, they say, is psychologically a blend or fusion of visual and kinæsthetic sensations.* Our binocular view of the book, its appearance to the two eyes, is in itself flat; but we run the eyes over it, and the muscular sensations thus blend with the visual. Nay more, even if we hold our eyes fixed, there is still a *tendency* to move them; and this tendency, now ingrained in our nervous system, is enough to realise the perception. Indeed, if experiment fails in every case to show the sensations of convergence and accommodation, that is just because the fusion is so long-established and so ingrained; we perceive distance, the fusion itself; we can hardly expect to recover the kinæsthetic sensations that originally entered into it; the wonder rather is that they should ever appear, that experiment should be able to reveal them at all.

No one can say positively that this hypothesis is wrong; but it is difficult to believe that the blend of visual and kinæsthetic sensations should yield a result so different from either, — namely, the perception of space. It seems safer to say that *the binocular picture*, the appearance of the book to the two eyes or the combined image of the stereoscope, *carries the immediate meaning of depth or voluminousness.* The picture is not itself deep or solid; but we cannot help perceiving it *as* deep and solid; and this pressure is laid upon us by what we have called racial heritage, an inherited

disposition of the nervous system; *the brain meets the impression halfway*. The binocular picture thus becomes the core or nucleus of the perception; and the meaning of depth is carried by a nervous disposition that has no correlate in sensation or image. The kinæsthetic sensations may then very well serve, as a secondary context, to give precision and accuracy to the perception, to develop the perception of crude voluminousness into the perception of definite distances. As to the nervous disposition, we can only say that it has been set up by the same biological causes that have made the organism a motor organism, one that moves freely in space; beyond that general statement we cannot go.

So far we have dealt with the space of sight; but there is also a **space of touch**; and we have next to ask *whether the perception of distance can be couched in terms of touch alone*. Our appeal lies to those who are born blind. Observations show that, in their case, the direct perception of solidity, of plasticity, is rare and fleeting; it arises, perhaps, when they clasp a child to their breast, or when they have been trained by long manipulation to distinguish objects of various shapes and sizes; it does not form a permanent item of their mental furniture. The blind *behave as if* they perceived distance; they avoid obstacles, — near obstacles by the pressure or temperature of the air reflected back upon their face, and remote obstacles by sounds; they can be taught geometry, and they measure objective distances by pacing; but the meaning of distance seems always to remain abstract, very much as the meaning

of light and colour must remain abstract; there is no realising perception of distance. The brain mechanism which is ready to act at once at the behest of sight thus seems to be lacking where touch alone is present; even the perception of crude volume, of depth, has to be built up afresh by the individual. *The blind live mainly in a world of sounds;* touch is employed, as a rule, only for special and limited purposes, such as dressing, reading, handicraft; and their world is therefore not pervasively spatial, like the world of the seeing.

Go back now, for a moment, to the objection raised on p. 124! We have, as a matter of fact, been led to the belief that **the meaning of depth is carried, in the last resort, by a brain-habit.** But how differently does this sentence read before and after the discussion! You have learned something of the difficulties of the study of perception; you see why it is necessary to look at perception historically, developmentally; you have been taken behind the obvious visual cues to the perception itself; you have seen how the kinæsthetic sensations and the binocular picture may be made the subject of experiment. Even the bare outline that the narrow compass of the present book allows should convince you that the objection was duly answered.

§ 29. **The Problem in Detail.** — Every one of our familiar perceptions might, now, be treated in this same fashion, and in indefinitely greater detail. We should start out with our pattern of sensory nucleus, imaginal context, and brain-habit; and we should push our analysis back and back, in the effort to reach the pri-

mary and ultimate form of the perception we were discussing. The quest is fascinating; for these are old, old bits of the mental life; to trace them home would be to go back to the Stone Age — or further; the earliest men we know of perceived the things that we perceive. Whether psychology will ever reach the final goal cannot be said; but at any rate the problems are genuine problems; they can be resolved only by intensive and long-continued work; and they demand an extraordinary ingenuity in the devising of experimental controls and an unusual degree of patience in experimenting. Men spend their lives among dead languages and buried cities; why not excavate and explore the inner world of perception?

Let us take an instance or two. Consider, first, the perception of **movement by the eye**. Many psychologists assume outright a special sensation of movement, something that we might call a *travel-sensation*. That hypothesis cuts the difficulty; but the sensation is no more admissible than the depth-sensation, and for like reasons. Other psychologists call attention, in a more scientific spirit, to the fact that in all cases of sudden change there is a *sensory index* of that change. If, for instance, a tone is quickly changed to a higher tone, or a light suddenly reduced to a duller light, there is a moment of sensory blur or confusion, a moment in which the quality or intensity ceases to be clear and distinct; so that, if you were called upon to identify it, you could say only 'It lies somewhere about such-and-such a part of the scale.' *This blur is the sensory index of change;* not a new sensation, but a modification of

existing sensation. We have it in the perception of visual movement; there is a blur of positions; and it may reasonably be referred to the positive after-image. A shooting-star flashes across the sky; it leaves a trail of after-image as it moves; you see it both at the place it started from, and at the place where it disappears, all in the same present time; thinking of it, nevertheless, as a star, a point of light like other stars, you perceive movement. The same thing holds for the perception of rapid movement on the skin.

So far everything is in order. Now, however, let us make a simple experiment. You know the **stroboscope** or zoetrope that is sold in the toy-shops: a cardboard drum, open at the top, that twirls on a handle; a strip of paper, on which are printed phases of some movement (the flight of a bird, the gallop of a horse), is placed inside, round the bottom of the drum; and you look down at the strip, while the instrument revolves, through vertical slits cut at regular intervals in the upper half of the drum-wall; you then see a continuous movement. Suppose that you make a new strip, on which you draw simply two lines, a vertical and a horizontal; you draw them some distance apart, but in such wise that, if they came together, they would form a right-angle. Turn the drum slowly, and you see the two lines; turn it swiftly, and you see the right-angle, like a letter L; turn it at a middle rate, and you see — according to the direction of turn — the vertical *fall over into* the horizontal, or the horizontal *rise up into* the vertical. You see movement, where there is no movement to see! Here, then, is a case of *perception*

of movement in terms of sheer brain-habit, of a settled nervous disposition that now has no mental correlate, but whose establishment has depended on the past history of the individual, possibly of the race.

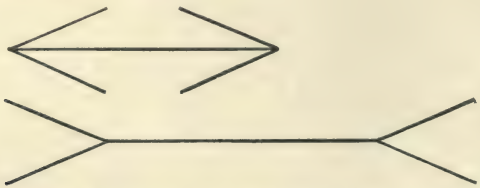
Take, as a second instance, the perception of **melody**. Primitive melodies seem to be of two types. In the one, the scale arises by synthesis of small tone-steps or tone-distances, which are approximately 'whole tones'; the melody consists only of two or three of these steps, and the last and lowest tone is the principal note of the tune. In the other, the scale arises by analysis of the larger consonant intervals, fourth and fifth; these intervals are broken up into smaller steps; the octave appears as a drone-bass; the first and highest tone is the principal note. An intermediate type keeps for the most part to small steps, but shows ascents and descents *portamento* through octave, fifth and fourth; it, too, makes the first and highest tone the principal note. We can account for a good deal of this development: we know that the voice cannot be evenly sustained in recitative, but naturally drops; we have reason to believe that the memory of absolute pitch is strongly developed in primitive peoples (parrots repeat their tunes at the same pitch, and the same thing is largely true of young children); we know the recurrent tonality of the octave (p. 52); we know that the fourth is the natural drop of the voice at the end of a sentence, and the fifth its natural rise in asking a question; we know that men, women and boys, singing in 'unison,' will really sing in octaves, and often in fifths and fourths; we know that the semitone, the final unit of our own scales, is

the smallest tone-step that can be accurately sung; we know that musical instruments were invented very early, and that they must have helped to give stability to the vocal scale. These things, however, are not enough. For behind all music lies what we must call an **intent to express**, as behind all speech lies an intent to communicate; and this intent baffles us; we can only say, once again, that it is carried by some native and ingrained disposition of the nervous system. The possibility of music is further bound up with the possibility of **transposition**; the melody must be reproducible and recognisable, whatever note it start from; and primitive melodies do in fact begin on different notes, and yet keep the same form. It may be that the primitive singer felt his tones, felt the adjustment of his larynx, more keenly than we do. Movements of the larynx are muscular contractions, and their sensations are subject to Weber's law (p. 68); so that, whether the vocal cords are slack or tense, their tension must be increased *in the same proportion* to get equal differences in muscular sensation. Here is a possible organic basis for the relative constancy of the tones within a melody; the difficulty is that even primitive melodies seem to be shaped, not by feel, but by ear.

We may take, as a third instance, a group of perceptions that have been named **optical illusions**. In a certain sense, most of our space-perceptions are illusory. Distance, for example, soon closes up on itself; if we try to stop, halfway, a friend who is walking down a long corridor, we shall be likely to call out before he has gone more than a third of its length. Size is illusory;

the size of the moon in the sky is that of a pea held at arm's length before the eyes. Form is illusory: how often do we see a table square? Only direction is adequately perceived. Yet we do not, somehow, think of all these things as illusions; we are used to them, and can make allowance for them.

There are, on the other hand, certain simple arrangements of dots and lines that yield, in perception, a result markedly different from that which measurement would lead us to expect. These figures have, in recent years, been made the subject of detailed study; that which is here shown has, in particular, been repeatedly discussed and variously explained. The simplicity of the forms is, indeed, treacherous and misleading; analysis is very difficult; and there is no present prospect that investigators will agree.



The two horizontal lines are equal in measurement; they are unequal to the eye. Why? One suggestion is that *the eye moves freely along the one, and hesitatingly and obstructedly along the other;* the obliques tempt out, in the one case, and hem in, in the other. The suggestion can be tested; for movements of the eyes can be recorded; and it turns out to be correct. The eyes, in passing over a line, like the lines of the figure or of a printed page, move by sweeps or jerks; they go so far,

halt, and start again. Experiment shows that movements along the lower horizontal take a longer sweep, and oftentimes come to a halt only when they have shot beyond the end-points of the line; whereas movements along the upper horizontal are themselves shorter, and frequently come to a halt before the extremities of the line have been reached. Here, then, is a kinæsthetic context to carry the meanings 'longer' and 'shorter.' Is the analysis adequate? Not for every case; the illusion is found to vary with *our general attitude toward the figures*. If we take them as wholes, the large open area below and the closed diamond-shaped area above strike the attention; we say, from total impression, that the lower horizontal is the longer. If, however, we take the figures critically, part by part, limiting our attention to the horizontals and disregarding the obliques, then the illusion is greatly reduced and may, with practice, disappear. Here, then, is a second context, which involves a brain-habit. Another suggestion is that *linear perspective* may be at work; the larger figure is a book opening toward you, the smaller is a book opened away from you; the lower horizontal is therefore further off, and should (if the two books were of the same size) be smaller than the upper; since it is not, the lower book is seen as the larger. There are, without doubt, many figures in which perspective influences the perception; but there seems to be no reason to invoke it here. A fourth suggestion is that we read into the figures *ideas of our own muscular state;* the lower figure has room to expand, it is stretching and yawning; the upper is cramped and huddled; and so the illusion of length is

produced. There is no doubt, again, that this putting of oneself in place of the lines plays a part in certain perceptions; but its influence here is negatived by the swallow figure; the birds flying toward each other are

further apart than those flying from each other. On the whole, we may be satisfied with the two contexts first mentioned; the discussion shows, however, how many and how various motives may enter in to determine an illusory perception.

§ 30. **The Types of Idea.** — Idea takes its plan from perception; and ideas may therefore be classified, like perceptions, as qualitative, temporal and spatial. When, however, we speak of **types of idea**, we usually have a different classification in view. Our ideas differ as our equipment of imagery differs; some minds are rich in visual or auditory images, others are poor or deficient. When first these differences were brought to light, they seemed to be permanent and clearly marked; children, especially, were classed *as eye-minded, ear-minded, and touch-minded* or motor-minded, according as their ideas consisted predominantly of visual, auditory, or kinæsthetic images; and it was thought no less necessary to discover a child's type, and to instruct him in accordance with it, than it is to test the colour-vision of pilots and engineers. Moreover, since all ideas may be translated into words, and since verbal ideas

may also be visual, auditory or motor, — ideas of the word seen, heard, or spoken, — three sub-types were added to the main types of idea; *the verbal-visual, the verbal-auditory, and the verbal-motor.* The doctrine of types found support in pathology; thus, the famous French physician J. M. Charcot reports a case of eye-mindedness in which visual ideas were suddenly lost. The patient writes: "I possessed at one time a great faculty of picturing to myself persons who interested me, colours and objects of every kind; I made use of this faculty extensively in my studies. I read anything I wanted to learn, and then shutting my eyes I saw again quite clearly the letters with their every detail. All of a sudden this internal vision absolutely disappeared. Now I cannot picture to myself the features of my children or my wife, or any other object of my daily surroundings. I dream simply of speech. I am obliged to *say* things which I wish to retain in my memory, whereas formerly it was sufficient for me to photograph them in my eye."

Nowadays the case could hardly be recorded in so simple a way; we have learned that *ideational type is a very complicated and itself a very variable matter.* Marked differences of imagery, as between one mind and another, undoubtedly exist; but the distribution into types is made difficult by two facts. The first is that there are great differences in the nature of images even where the gross type is the same; thus, of two predominantly eye-minded persons, the one may have vivid and precise, the other vague and obscure images. The second is that imagery varies with the nature of the test made,

the situation or material that arouses the images; in strictness, we can only say that, under such-and-such conditions, the imaginal type proved to be such-and-such. With these cautions before us, we can, however, make out four common types. The **versatile** type uses visual, auditory and verbal-motor images more or less indifferently. A second type prefers **visual** images, with verbal-motor a good second. A third type prefers **verbal images of the auditory-motor kind**, with visual images a poor second. A fourth is almost exclusively **verbal-motor**. In this last type, kinæsthesis, in the special form of the feel of articulation, has reconquered the place that it held in the long-gone past, before speech had come (p. 119).

We observe nothing of these differences in daily life, simply because we are interested in meanings and not in processes; so long as the audience gets somewhere near the meaning that the speaker or writer is trying to convey, everything necessary for practical purposes has been accomplished. All the same, *there are many signs of ideational type*, if we are on the alert to seize them. The attitude of attention is different, according as a man's ideas are visual or auditory-motor; the child's mode of recitation is different, slow and systematic in the former case, quick and impulsive in the latter; the mistakes made are characteristic; and you can tell by an author's style whether he has visual images and whether he hears his sentences ring in the mind's ear. *It is natural to connect the dominance of certain images with the choice of certain professions; but a correlation cannot be made out.* "I should have thought," remarks

Galton, " that the faculty of visualisation would be common among geometricians, but many of the highest seem able somehow to get on without much of it; " and again " men who declare themselves entirely deficient in the power of seeing mental pictures can become painters " of acknowledged rank. The late Professor James wrote to the same effect: " I am myself a good draughtsman, and have a very lively interest in pictures, statues, architecture and decoration. But I am an extremely poor visualiser." These statements, to be sure, were made without any thorough-going investigation; we must remember that there are different ways of geometrising as there are different styles and ideals of painting; and we may add that there are plenty of instances on the other side; Goethe and Dickens were magnificent visualisers. The study of imaginal type, in relation to the interests and achievement of its possessor, thus offers an inviting field of work.

Questions and Exercises

(1) State in your own words, and without looking at the book, why the psychologist has to do with meaning, and what meaning is psychologically. Illustrate from your own experience; find, in particular, a case of meaning carried by kinæsthesis, and a case of meaning carried in purely nervous terms.

(2) Draw diagrams to illustrate the typical perception and idea, and the various stages in its reduction to the skeleton-type described at the end of § 24.

(3) Qualitative perceptions undergo relatively little change. What changes have they undergone? How is it that these changes have not unfitted them to mean quality?

(4) A stereoscope and a set of slides prepared by the author may be obtained from the C. H. Stoelting Co., 3047 Carroll Avenue, Chicago, Ill. Explain the construction of the stereoscope, part by part; and work carefully through the slides, writing down what you see. It is useless to play with the instrument; take the experiments seriously.

(5) If you are touched with a pencil on wrist and chest, and try to retouch the places stimulated, you are more nearly right on wrist than on chest. Why? Try the experiment several times over.

(6) You have probably often heard the rising tone of a siren-whistle sounded by some manufactory or given as a fire-signal. Can you image it? If so, what is the index of change? If not, try to lay your finger on this index when you next hear the whistle.

(7) If tastes and smells have not the attribute of extension, how do you account for their apparent spread in space? If sounds are not spatial, how is it that we can localise them?

(8) Is there such a thing as a purely visual rhythm? How would you approach the question experimentally?

(9) Perform Aristotle's experiment, by crossing the second over the first finger of the right hand, and pressing on a

marble placed under the crossed joints. (*a*) Is Aristotle's statement correct? Write out your observations. (*b*) Is sight decisive? Helmholtz said, on the contrary: "We are continually controlling and correcting the notions of locality derived from the eye by the help of the sense of touch, and always accept the impressions on the latter sense as decisive." (*c*) Can you work out the perception of a *thing* or *object*, somewhat as the book has worked out the perception of distance?

(10) Can you suggest methods for the determination of imaginal type?

(11) Close your eyes. (*a*) Let an experimenter draw a blunt-pointed pencil *at an even rate* along the inside of your arm from the shoulder to the tip of the middle finger. The point seems to travel more quickly at some places than at others: why? Draw a diagram of the arm, and mark the places of apparent slowing and quickening. (*b*) Tie two pencils together with a bit of rubber between, so that the points are $1\frac{1}{4}$ to $1\frac{1}{2}$ in. apart. Let an experimenter set the two points crosswise on the skin at the shoulder, and draw them with even speed and pressure along the inside of your arm to the finger-tips. The points seem to converge and diverge: why? Draw a diagram as before.

(12) If a rough thread is drawn by an experimenter between your forefinger and thumb, at first quickly and then slowly, it will seem shorter in the first experiment than in the second. Why?

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CHAPTER VI

Association

Here is a kind of attraction which in the mental world will be found to have as extraordinary effects as in the natural, and to show itself in as many and as various forms. — David Hume

§ 31. **The Association of Ideas.** — The doctrine of the 'association of ideas' is one of the oldest and most influential in the history of psychology. It begins, in a somewhat casual way, with Aristotle. Suppose, Aristotle says, that we are trying to recall something that has slipped our mind; what do we ordinarily do? We hunt through a number of things, beginning with something that is like what we want to recall, or contrary to it, or that was next it in time, or adjacent to it in space. These other things, the like, the contrary, the just before or just after, the adjoining, have the power to suggest what we have forgotten. Aristotle gives the impression that everybody acts in this way, as a matter of course; and no doubt his hearers acquiesced; for the statement sounds reasonable. We want, for instance, to remember a certain picture that we saw ten years ago: how do we set to work? We start from something like it: 'I remember that it reminded me of Van Eyck'; or from something opposite: 'I remember smiling to think how a Venetian would have treated it'; or from something next it in time: 'I remember coming to it

after three whole hours of Dutch *genre*'; or from something next it in space: 'I remember that it hung beside a Mabuse portrait.' Seeing how natural and obvious such remarks are, we can understand that Aristotle's single sentence had tremendous consequences for psychology. It foreshadowed the four 'laws of the association of ideas,' *the laws of similarity, of contrast, of succession in time, and of coexistence in space.* According to the doctrine of association, one idea 'calls up' another *because* it is like that other, or contrasts with it, or was next to it in time or space; likeness and difference, succession and adjacency, somehow give an idea the power to recall, and render it liable in its turn to be recalled. The four laws thus represent an attempt to *explain* the course of our ideas, and for that reason they have always appealed to common sense.

But, for the same reason, the laws have not proved an unmixed blessing to psychology. Aristotle, it is clear, was simply raising a practical question; and practical questions are answered in terms of meaning, not of process. Moreover, Aristotle was temperamentally a logician, and he could not help throwing even this bit of everyday practice into formal logical shape. Notice the arrangement in pairs: like-contrary, coexistent-successive; that is logical. Notice also the nature of the pairs. Like-contrary is the extreme way of saying like-unlike; and when you mention succession, you mention the only kind of non-coexistence that can come into account for psychology; so that both pairs have the form 'A and not-A' (like and not-like, coexistent and not-coexistent); and that is logical again.

Aristotle's four rules are therefore not really empirical, in the sense that they are directly derived from a study of experience; they rather show the inveterate logician, who is bound to schematise and tabulate. Later writers, swayed now by experience and now by logic, have both increased and decreased the number of these ' laws ' of association; *the general tendency has been to reduce them to two, or even to one.* Thus, we can make contrast, logically, a case of likeness; the palace reminds us of the hovel, apparently by contrast; yet are not the palace and the hovel alike, as human habitations? We can, still more easily, reduce space to time. If the two pictures hung together on the wall, they were seen at the same time. Simultaneity, however, is one kind of contiguity in time; succession is another; and temporal contiguity thus includes everything. The four laws have become two: *similarity, and contiguity in time.*

Can we go further? Yes, if we go on arguing. The picture reminded me of Van Eyck; it was *like* a Van Eyck; the association seems to be an association by similarity. Yet it is practically certain that the picture in question was, at some time or other, present in my mind *along with* some picture by Van Eyck. It is practically certain, in other words, that the two ideas were in temporal contiguity; and every instance of association by similarity raises the same sort of presumption. That being the case, we may discard the law of similarity; and **contiguity** stands alone, the sole survivor of the Aristotelian quartet. Only, **this is all logic**, a matter of meanings, a translation of psychological fact; we have not got to the facts themselves.

We shall come to psychology presently. Meantime *you should try to realise how well this doctrine of association works for practical purposes, and how strong is the appeal it makes to the practical side of our nature.* It explains the appearance of every single idea that has ever occurred to anybody; it offers to take us to the very heart of psychology without need of training or preparation; it flatters us into the belief that we have all our lives been talking and thinking psychology without knowing it; it covers up the gap that separates common sense from science. Small wonder that Hume compared the law of association in psychology with the law of gravitation in physics! All the great names in British psychology (and the fact throws a good deal of light on the psychology of the nation itself) are connected with the doctrine of association; a whole science has taken its national colour from a single principle of explanation. Association has also played its part, though less dominantly, in France and Germany.

Realise all this; and realise also that the doctrine was of great service in the days when psychology was in the making; it is not only agreeable to common sense, it is not only historically important, but it also *did true psychological service.* Let us admit all this: and then we must add that *the reign of associationism was over as soon as ever psychology became scientific;* as soon, that is, as the proper task of psychology was recognised and formulated (p. 18). For let us take an instance: what does the word 'summer' suggest to you? Very likely it suggests 'winter.' How, then, is this association to be explained psychologically? By contrast? But

the ideas of summer and winter may be exactly alike, both of them verbal-auditory-motor, or both of them mental pictures; the contrast is a contrast of meaning, not of mental process or pattern; the real summer, what we mean by the word 'summer,' contrasts with the real winter, and not the idea of summer with the idea of winter. By resemblance? But, if the ideas of summer and winter are exactly alike, so are they also like thousands of other ideas, verbal-auditory-motor or visual-imaginal; there is no reason in their psychological likeness why the one should suggest the other; and if they do suggest each other by 'resemblance,' the resemblance is again a likeness of meaning (they are both seasons of the year) and not of mental constitution. Try the matter out for yourself, in any concrete case of association, and you will reach the same result; the ideas of associationism are not psychological ideas. James sums things up for us: "Association," he says, "so far as the word stands for an *effect*, is between *things thought of;* it is things, not ideas, which are associated in the mind. And so far as association stands for a *cause*, it is between *processes in the brain;* it is these which, by being associated in certain ways, determine what successive objects shall be thought." **The brain associates, and meanings are associated.** We have already said something of the psychology of meaning (pp. 26 ff., 117 ff.); what can we now say of the associative functions of the brain?

§ 32. **Associative Tendencies: Material of Study.** — We want to find out how those processes in the brain

which are the correlates of our ideas go together, get connected or associated. The brain is a machine; and it is not only complicated, but it is also plastic, that is, it is subject to change and modification. The *complexity* of the machine makes it necessary for us to work with simple stimuli and by strict methods; only if we work with simple stimuli shall we get to the bare essentials of the associative functions; and only if we work by strict methods shall we obtain results which other investigators can repeat and verify. Even so, the *plasticity* of the machine makes it impossible for us to lay down hard and fast laws of connection; we can speak only of connective tendencies or of **associative tendencies**; what actually happens, in any particular case, is likely to be the joint result of many tendencies, weak and strong, conflicting and concurring.

The task before us is, therefore, not easy; but it is straightforward; and that is the next best thing. We want to find out how associative tendencies in the brain are set up; and to do this we must, evidently, find some way of *creating* a bond between one nervous process and another; we must devise experiments in which we *make* or *construct* brain-connections. We need not look far afield; for we make such connections whenever we **learn** anything new; so that we have only to learn under experimental conditions, and the task is accomplished. But what shall we learn? what stimuli shall we employ in the experiments? 'Words,' you will say; and words have many advantages for learning; but they have, in this case, the supreme disadvantage that they are ingrained meanings. Words therefore will not do;

but something very like them will. The question of the stimuli to be employed was, in fact, answered for us, thirty years ago, by the German psychologist Hermann Ebbinghaus, who — by one of those happy thoughts that come after long and intensive occupation with a subject — hit upon the notion of the **meaningless syllable**. Ebbinghaus made up over 2000 meaningless 'words,' all consisting of a vowel or diphthong between two consonants; syllables standing in the same relation to his own language that leb, rit, mon, yup, kig, wes, der, zam, for instance, bear to English. See the advantage of this kind of material for the work we have in view! The syllables are just like words, in that they may be seen, heard, or felt in the throat; they are unlike words, and vastly superior to them, in that they have no habitual associates; they lack context and meaning; every syllable in a series may be considered to have the same chances of making connections as every other. The material is so rich and varied that endless experiments can be made; it is so simple and uniform that the results of one experiment may be compared directly with the results of another; it may be drawn from any language, and so may be used in the laboratories of any country. Moreover, it is absolutely under control; it is just the kind of material that we need when we are tied down to strict and accurate method; we can vary at will the manner of presentation to the learner, the number of syllables in a series, the rate at which they follow one another, and so on; and the report required from the learner himself is easy and natural; there are no long descriptive phrases; he has

only to say or to write the syllables he has learned. Lastly, *we may proceed from experiments with this meaningless material to experiments with real words*, words that mean; and we may hope in that way to pass beyond the bare essentials of the brain's associative function, and to get a clue to the complex interplay of associative tendencies in real life. All in all, it is not too much to say that Ebbinghaus' recourse to meaningless syllables, as means to the study of associative tendencies, marks the most considerable advance, in this chapter of the psychological system, since the time of Aristotle.

§ 33. **The Establishment of Associative Tendencies.** — The use of **meaningless syllables** has brought with it a whole armoury of technical methods for the study of the associative tendencies. We have here no space to treat of these methods in detail; fortunately, the results that we shall mention speak for themselves; and it may be added that all the methods of experiment are, in principle, changes rung upon one simple model, in which the observer sits down before a series of syllables, reads them through, so-many times over, in a state of attention, and then, either immediately or after an interval of time, repeats them 'from memory.' We proceed, then, to answer the question: How are associative tendencies established in the brain?

Their establishment depends, first and most obviously, upon the *number of syllables* in the series presented to the observer. While he can recite correctly, after a single reading, a series of 6 or 7, a longer series simply

throws him into confusion. The first and last terms have a definite advantage; they may, indeed, be the only syllables that can be repeated after a single reading of a 12-term series. Secondly, the tendencies are strengthened by *repetition*. The first reading is more important than any other single reading; after that, there is for a while little if any improvement; then the results take a sudden step up; and thenceforward progress is fairly steady until the limit of the experiment is reached. Thirdly, the tendencies are furthered by a *grouping* of the syllables. The observer learns a series more quickly if, for instance, he throws it into a rhythm. Fourthly, it is important to *distribute* the readings in time. Two readings a day for 12 days give better results than four a day for 6 days, or eight a day for 3 days, although the total number remains the same. Fifthly, the *rate* of reading has its effect; the syllables must not follow one another too fast or too slowly. There are great differences between individual learners; but we may say in general that the syllables should at first be presented at a moderate rate (perhaps two in the second), and that the rate should be slowly increased as the readings proceed. Sixthly, not only repetition itself, but also the *manner of repetition*, makes a difference. Meaningless syllables are learned somewhat better if the whole series is read through, over and over, from end to end, than if they are taken a few at a time, in small lots. Lastly, *recitation* or reading aloud is ordinarily more effective than silent reading; largely, perhaps, because the separate pronouncing of every syllable equalises attention; every term of the

series is brought out sharply and clearly, and there is no chance to slur.

Here, however, we must remember the differences of imaginal type (p. 138); and it is true that a markedly visual learner will profit less by recitation than an auditory-motor learner. These experiments have, indeed, revealed other typical differences between individuals, such as those of *slow and quick*, and of *receptive and ingenious* learning. Some of us, it seems, are naturally quick, and some are naturally slow learners, just as some work best at night and others in the morning. Some observers, again, accept the series of syllables. passively and without question; others embroider and interpret the meaningless forms in all manner of ways; *mon* becomes man, and *kig* king, and *wer* where, and so on. We know nothing at present of the correlated differences in the nervous system.

The results just given may be compared with those obtained when **meaningful stimuli** are employed. Thus, 8 or 9 one-syllable words, and 10 to 12 one-place numbers, can be recited after a single reading. Meaningful material, which is grouped or unified by its topic, may be learned ten times as quickly as meaningless syllables. It may also be presented more rapidly; iambic and trochaic verses, for instances, may be taken at double the rate of the syllables. Dates of historical events, and the words of a foreign language, are best learned like the meaningless syllables; and connected meaningful material, like a poem or an oration, should very decidedly be read as a whole, from end to end, in the successive repetitions. If there are brief passages of

unusual difficulty, they may, of course, be gone over by themselves, in the intervals between the total readings; the general rule, however, is to learn by wholes. This appears, in fact, to be the procedure generally followed by bards and tellers of folktales; and actors who play many rôles in quick succession are able to ' wing a part,' as the phrase goes, by reading it through several times over at brief intervals. Children who memorise a poem in sections, a stanza now and a stanza to-morrow, waste a great deal of time.

Let us now come back to the **meaningless syllables**, and ask what is *the net result of all the influences* that we have listed. Suppose, in other words, that a series of syllables has been presented at a certain rate, thrown into a certain rhythm, repeated a certain number of times with fitting distribution in time, recited at every repetition: what is the final outcome, as regards the establishment of associative tendencies in the brain? It is this: *that a strong connection has been set up between the successive terms of the series, in the order of their presentation; and that weaker connections have been set up between every term and every other term, whether the terms are near or remote in the series, and whether they are taken forwards or backwards.* Let us illustrate by reference to the alphabet. If the alphabet represents a series of meaningless syllables, then there is a strong connection between *a* and *b*, *b* and *c*, . . . *y* and *z*; but there are also weaker connections between *a* and *d*, . . . *v* and *z*; and further, there are connections backward between *z* and *y*, *z* and *x*, . . . *d* and *a*. The series of syllables has thus impressed the brain with *a*

very complex meshwork of associative tendencies, stronger in some places (direct forward connection) and weaker in others (remote and backward connection), but still functionally interconnected through all its parts.

§ 34. **The Interference and Decay of Associative Tendencies.** — If a set of associative tendencies, such as we have just described, is left to itself, and neither disturbed nor renewed, it *gradually disappears;* the loss is at first very rapid, then proceeds more slowly, and thereafter goes on only at a snail's pace. To make the matter concrete, we may think of the meshwork of tendencies as a meshwork of channels, deeper and shallower, in the substance of the brain; then the rule is that the channels tend to fill up, — the shallow ones speedily, the deeper ones at first quickly and then more and more slowly, — until everything is smooth again. This is a mere figure, but it carries the meaning that we desire. The same thing happens with *the tendencies set up by meaningful material;* they too slowly die away; but *it is doubtful if they ever wholly disappear;* in their case the brain, if it has been thoroughly impressed, seems never wholly to 'forget.' Ebbinghaus learned some stanzas of Byron's Don Juan, for experimental purposes, and did not look at them again for 22 years; yet he relearned those stanzas in 93 per cent. of the time required to learn new stanzas; a saving of 7 per cent. Some stanzas that he had learned more thoroughly were not read again for 17 years; these were relearned with a saving of nearly 20 per cent. He had no memory whatever of the verses formerly learned; but his brain 're-

membered'; the associative tendencies had not completely disappeared.

As a rule, however, a particular set of tendencies is not allowed to die a natural death; it is interfered with by others. *All associative tendencies need a certain time to establish themselves*, to settle down; and if this time is not granted, but stimulus treads on the heels of stimulus, there is no impression of the meshwork, and no connections are formed; we have seen that a series of excessive length simply throws the learner into confusion. A recently acquired connection may even be abolished, as most of us know to our cost, by interruption of the train of thought; you have just got to your point, to the insight, the phrasing, the argument, that will clinch things; you are distracted by some irrelevant matter; and when you come back to your work, the point has gone. So nicely balanced and so easily disturbed are the associative tendencies, that you may never recover it; no wonder that the constructive worker, in literature, in science, in affairs, 'hates to be interrupted'!

With meaningful material, interference may arise in other ways. Take the alphabet again; *a* is connected with *b* through the frequent repetition of *abc*, but is also connected with *z* by the phrase '*a* to *z*.' If, then, *a* appears; and if the *b*-tendency and the *z*-tendency are of approximately equal strength; then there may be no connection at all; the two tendencies cancel or inhibit each other. A question may leave you dumb, not because you have no answer, but because you have so many different answers that no one of them can force

through to expression. This sort of interference, which comes at the end of the associative process, is called **terminal inhibition**; there is another kind, coming at the beginning of the process, which we may call **initial inhibition.** If *a* is already connected with *b*, then it is difficult to connect it with *k*; *b* gets in the way. You have some particular fault of style, or you have fallen into the habit of spelling wrongly some particular word; you want to correct the fault, to spell aright. But every time that you are off guard, the mistake recurs; the existing connection *a-b* heads off the desired connection *a-k*.

Fortunately, there are compensations. If a group of tendencies, for instance, does escape interference, then *the brain settles down of itself*. Schoolboys, with a keen sense for economy of effort, learn their lessons only partway overnight, and find that a hasty review next morning is enough to fix them; the associative tendencies work while their owners sleep. The practised speaker, knowing that he has to talk on a certain subject at a certain date, marshals his present ideas in half-an-hour of concentrated attention, and then drops the whole thing; his brain incubates it for him; and when the appointed day comes near, he finds that his associative tendencies have practically prepared his address. Besides, the tendencies may converge, as well as interfere; we have seen how continued attention opens the mind to relevant facts and closes it against the irrelevant (p. 98). If they did not, it would be impossible for us to follow the thread of a paragraph, to say nothing of a chapter or of a whole book. **Convergence**

thus offsets interference. We shall meet it in various forms later (§§ 42, 45, 65); meantime we leave the brain, and pass to the mental processes themselves. How are they connected?

§ 35. **The Connections of Mental Processes.** — So far as the elementary processes are concerned, this question has already been answered in our discussion of perception. We found that there were *two modes of sensory connection*, two ways in which sensations may go together. In qualitative perceptions, such as the perception of a musical note, there is a blend or **fusion** of qualities; we can, to be sure, analyse the compound tone, after practice, into fundamental and overtones; yet it still comes to us as unitary, as a single impression; it stands only at one remove, so to speak, from the simplicity of sensation itself. The tastes of coffee and lemonade, with their blending of taste and smell, of touch and temperature; the organic feels of hunger and thirst and nausea; the kinæsthesis aroused by grasping and pulling, by lifting the arm and swinging the foot; all these experiences are fusions, more or less intimate, more or less complex, of sensory qualities. They too can be analysed; but the analysis is not easy; the qualities cling together, seem in a way to merge into one another. In spatial perceptions, on the other hand, in such perceptions as the sight of my desk with its litter of writing materials, the elementary processes stand out side by side; brown contrasts with blue, dark with light; here, we might say, is no confluence, but rather concourse. In the perception of rhythm we have the same separate-

ness of sensations, only that it is now temporal instead of spatial; and in the perception of change (p. 132) we find both modes of connection, separate qualities or intensities passing into one another by that peculiar blur or fusion which we have called the index of change. This second type of connection, whether it is the side-by-side of space or the end-to-end of time, may be named **conjunction.**

The associative tendencies which we have been more recently discussing are set up by series of meaningless syllables, that is to say, by discrete stimuli. It is clear, then, that the connection of the correlated mental processes is of the conjunctive type; we have said nothing of the brain-processes which underlie sensory fusion. We can, indeed, say nothing of them; we have no knowledge of their nature. It has been suggested that qualitative perception is correlated with a *synergy* of the brain-processes, that is, with a cooperation so close that every process taking part in it loses something of its individuality. That is possible; we cannot say more.

When we leave the elementary processes for *complex experiences*, for perceptions and ideas, and ask how these are connected, we cannot return any completely satisfactory answer. Experiments may be made; thus, a familiar visual stimulus (word or simple picture) may be shown for a few seconds to the observer, with the instruction that he receive it passively and report the consequent course of his mental processes. Under these circumstances, it invariably happens that the stimulus is immediately named. After that, apparently, any one

of *three typical things may happen.* First, the named perception is supplemented by a sense-feeling. A word printed in very small letters on a large background aroused the feeling of loneliness; a word printed in red, a feeling of excitement; the word 'blinding,' the disagreeable feeling of a dazzling light. Then the feeling gives way to an idea, which supplants the meaning of the stimulus. Secondly, the named perception is resolved into the idea of some object previously seen. An outline drawing of a face may be replaced by the idea of a friend, whose features are, so to say, read into the drawing; or the word 'Tell,' printed on a blue ground, may be replaced by the idea of the familiar picture of William Tell springing from a boat to the rocks; the blue of the background becomes the blue sky of the painting. Thirdly, and only occasionally, the named perception is followed by an idea which comes separate and detached; we have the traditional pattern of the 'successive association.' These three types of connection (there are, of course, intermediate forms) do not furnish a satisfactory answer to our question, mainly because the experiments are not properly under control; the observer comes to them with all sorts of associative tendencies at work; and unless we make a very large number of observations, we cannot be sure that our results are either representative or exhaustive.

At the same time, such experiments help us; they show, for instance, that the doctrine of association — quite apart from its logical leanings, or perhaps just by reason of them — regarded the course of ideas in too 'intellectual' a way; *the sense-feelings, and other feeling-*

blends that we shall mention later, play a larger part in our thinking than the associationists dreamed of. They show, too, that *the 'successive association' is not the commonest, but rather the least common, form of mental connection.* Listen to a quotation from Hobbes! "In a discourse of our present civil war," he writes, "what could seem more impertinent [less to the point] than to ask, as one did, what was the value of the Roman penny? Yet the coherence to me was manifest enough. For the thought of the war introduced the thought of delivering up the king to his enemies; the thought of that brought in the thought of the delivering up of Christ; and that again the thought of the thirty pence, which was the price of that treason. And thence easily followed that malicious question: and all this in a moment of time, for thought is quick." Hobbes has worked out the logical coherence, the coherence of meaning; but he is very far from a psychology of the situation. What actually took place in the mind of the questioner we shall never know; we may be very sure, however, that his mental processes did not follow one another in logical order, as Hobbes imagines. There was a convergence of associative tendencies, which expressed itself in the question; there need not have been any succession of ideas at all.

§ 36. **The Law of Mental Connection.** — We have spoken at some length of the establishment of associative tendencies in the brain, of their decay with time, and of their mutual interference. Can we sum up our knowledge of them in *a single general statement?* And

can we then translate this general statement into **psychological** language, and so reach a *formula of mental connection* that may stand in place of the logical laws of association? Let us try.

We must proceed very carefully, even if our care drives us into clumsiness of expression. We cannot, for instance, leave out the fact that the meaningless syllables are given in the state of *attention*. It appears, indeed, that attention is necessary to association; we may doubt if any amount of repetition — to take that example — would set up an associative tendency, were it not for attention. Repetition, we remember, is one of the determinants of attention (p. 94); so that the repeated experience is likely to become vivid in the very nature of the case; but if it does not, if for any reason our attention is diverted or we fail to notice the stimulus, repetition has no associative power. How many of us would like to recall the carpet or wall-paper of the room we slept in as children! Thousands of times we saw the colours and the patterns; but our adult memory is an absolute blank; those repeated stimuli never 'impressed' us.

We cannot either leave out the fact that the meaningless syllables are bracketed all together, so to speak, by a certain *situation*, namely, the situation created by the experiment. The observer comes to them, in accordance with this situation, intending to learn them, to memorise them: a fact of very great importance! — and a fact that needs to be dwelt on for a little, if we are to see our way clearly in what follows. We said on p. 149 that *meanings* are associated. Yet we have

been studying the formation of associative tendencies in the brain, the associating organ, by the help of — meaningless syllables! Is there not a flat contradiction here between theory and practice? No, that is really not the case; and the key to the riddle lies in this fact of the 'situation' which we are now discussing. The syllables are meaningless *as* syllables; they are thus set apart from ordinary syllables that are meaningful; and it is this difference from *words*, combined with their likeness to words in other respects, that makes them useful to the experimenter (p. 151). For since they are themselves meaningless, we can put upon them a constant meaning of our own; we can introduce them into any situation of our own making; and the meaning that we give them, in the study of the associative tendencies, is the meaning of 'an experimental series to be learned under certain instructions': a meaning which is definite, and which remains the same throughout the experiments. You see, then, that the 'situation' is important.

Attention, as we know, means reinforcement of certain nervous processes and inhibition of others (p. 107); and the intention to learn implies the activity of directive nerve-forces (p. 96), the existence of a special set or disposition of the brain. Let us keep these things in mind; and let us call the brain-processes that are correlated with mental processes 'psychoneural' processes. Then we may say: *When a number of psychoneural processes, all of which are reinforced and all of which stand alike under the directive influence of a nervous disposition, occur together under certain favourable conditions,*

then **associative tendencies** *are established among them, such that the recurrence of any one tends to involve, according to circumstances, the recurrence of the others.* The phrase ' under favourable conditions ' refers to the effect of repetition of the series, of their distribution in time, and so forth; and the phrase ' according to circumstances ' means that heed must be paid to the lapse of time since learning, to the working of initial or terminal inhibition, and so forth.

So much for a generalised law of associative tendency, derived from the work with meaningless syllables! That is *a law of nervous action;* now let us turn to **psychology**, and see if we can formulate a law of mental connection. We shall be dealing with perceptions and ideas; and we shall be dealing with them as experiences, made up of core and context (p. 117).

Attention is again necessary. Intention, on the other hand, seems not to be necessary; there need be no special purpose behind the experiences, as the intention to learn is behind the experiments with meaningless syllables; attention is enough. The idea of a surgical operation, for instance, may be permanently connected with the idea of the surgeon who performed it, although the intervention of that particular surgeon was quite casual and unexpected. The reason is that *attention brings a situation, its own situation, with it;* the determinants of primary attention are, as we put it on p. 97, the ' great biological stimuli,' things that an organism *must* take notice of, if it is to persist as a living organism at all; and the determinants of derived primary attention are also what we may call ' situational '

affairs, things that appeal in certain circumstances to certain sides of our nature, things that interest or 'impress' us. So attention, too, implies a set or disposition of the nervous system; common sense is so far in the right — though its words are misleading — when it talks of a 'concentration of the mind,' of 'pulling oneself together,' and the like; and *this general set is sufficient*, without the presence of a distinct purpose. Our law will read, then, somewhat to this effect: *If a number of vivid perceptions or ideas, whose situational context is the same, occur together under favourable conditions, then the later appearance in the same situational context of any one will tend to be accompanied, according to circumstances, by the reappearance (as ideas) of the others.*

That is correct, so far as it goes; though, as we shall see in a moment, it does not go quite far enough. Meanwhile, you must clearly realise that *the processes which compose the perceptions and ideas are extremely variable.* We have already discussed this matter; we have seen that the perception of an object and the idea of the same object do not by any means correspond, term for term, like original and copy; the form of our ideas depends, in the first instance, upon our imaginal type, and secondarily upon the special circumstances under which they appear (pp. 139 f.). When, therefore, we speak of 'the later appearance of an idea in the same situational context,' we really mean the appearance of that complex of mental processes which, under the law of imaginal type and under the special circumstances of the moment, has taken the place of the original complex. In the next chapter we shall be discussing the 'memory-

image,' and you will then be shown how radically an idea may be transformed; so radically, that it may be likened rather to a translation than a copy of the perception, rather to a rendering into another language than a reproduction. If you want a catch-phrase, to hold this fact of change in mind, *think of association as a marriage by proxy;* the marriage-bond, the situational context, remains the same, but the parties are represented by very variable mental complexes.

Now for the law once more! *The formula does not go far enough; for while it covers the movement of ideas within a single situational context, it does not show how we may pass, as we undoubtedly do, from one situational context to another.* Here a diagram will, perhaps, make things plain. Suppose that we start out with an idea

a, composed of core and context, and lying within the wider situational context of the right-hand oval. The appearance of *a* is followed, let us assume, by the reappearance of *b*, which lies within the same situational context. The idea *b* may be followed, in its turn, by *c*. But since *b* belongs also to a second situation, represented by the left-hand oval, it may be followed instead by the idea *x*; and in that event we shall have travelled from the one situational context to the other. Whether *c* or *x* comes up is a matter which depends entirely upon the relative strength of the associative tendencies at

the moment. The diagram, it is needless to say, is immensely over-simplified; we have placed *a*, *c*, and *x* within *one* situational context only, and we have made the ideas *follow* one another in single file; but it shows how our formulation of the law must be extended, if we are to 'get in' all the facts. We must add: *If certain of these reappearing ideas belong also to a different situational context, they will tend to be accompanied, again according to circumstances, by the ideas which formerly occurred together* (*as perceptions or ideas*) *within that context.* In point of fact, most ideas belong to very many different situations, so that the interweaving of the associative tendencies may be highly complicated.

These paragraphs will strike you as both difficult and clumsy; but, if you review the course of the whole chapter, you will perhaps agree that our attempt at formulation has been worth while. We began with Aristotle's four rules, and found that they are logical and practical, and also that they may logically be reduced to one, the 'law of association by contiguity.' That law did not satisfy us; we agreed with James that the *brain* associates and that *meanings* are associated. So we went to the brain; and by the aid of meaningless syllables we traced the history of the associative tendencies. Coming back to psychology proper, we distinguished the fusion and the conjunction of mental processes, and noted that the experimental method does not yet permit us to follow the patterns of mental connection in the large; though the experiments already made furnish additional proof that the old 'laws' of association are psychologically valueless. Now, to con-

clude, we have sought, first, to bring all that we know of the associative tendencies under a single formula; and then, building upon that formula and upon our partial knowledge of the patterns of mental connection, to write a psychological law that shall replace the logical law of contiguity. We have had to safeguard and qualify, and to leave loose ends for individual variation; but at any rate we have something positive whereby to support our criticism of the doctrine of association.

§ 37. **Practice, Habit, Fatigue.** — The establishment of an associative tendency may be looked upon as the establishment of a *habit* of brain-function; the learning of series of syllables improves with *practice;* and continued learning gives rise to *fatigue.* It is natural, therefore, that we should here pause to say something about these three things in their relation to psychology.

All **practice** begins in the state of *attention;* but practice, once started, may go on when attention is distracted from the matter in hand. We give a great deal of attention to our first finger-exercises on the piano; presently, if we have continued them long enough, we may practise Chopin on the clavier while we are reading a book or thinking out a problem; the fingers do the practising for themselves. If we follow *the course of practice,* from day to day, we find that improvement is not steady; we gain very quickly at first, then come to a point at which we remain stationary for a while, then make another and slower gain, then rest at a second plateau or level of practice, and so on. It is doubtful, however, whether this stepwise advance is characteristic of prac-

tice itself, that is, of the nervous change produced by repeated stimulation of the same nerve-elements; it seems rather to be due to changes in our method of working, to the sudden discovery of some new trick of procedure, or the sudden release from some hampering peculiarity of method. We cannot speak in positive terms since, unfortunately for psychology, the investigators of practice have been more concerned with outward results and practical value than with description of the correlated mental processes.

In psychological experiments, *the practised observer has a threefold superiority over the unpractised:* his attitude to the stimuli, in successive observations, is more nearly uniform; his attention is sustained at a higher level; and his discrimination is more refined. This means that the focal mental processes are few in number; that they are extremely vivid; and that they are protected, by strong inhibitory forces, against intrusion from the outside. It is clear therefore that practice is very desirable; but it is clear also that experimental results may be compared only if the stage of practice at which they are obtained is the same. This rule has some odd examples: an observer, for instance, who is practised in the discrimination of lifted weights grows physically stronger with his practice, and may therefore judge quite differently from the unpractised observer.

Habit is, in general, the outcome of practice; if practice shows us a nervous set or disposition in the making, habit is the set taken, the disposition established; the plastic organ has hardened in some special way. Like

practice, habit in its early stages requires *attention;* but it is to be noticed that a habit may be formed, not only by the repetition that practice brings, but also by any single stimulus that violently impresses the nervous system; the plastic mechanism may be thrown, by a sudden wrench, into a new and permanent arrangement; just as we may give a permanent bend to a fencing foil by a single violent lunge. We have already seen, in our discussion of the development of attention (p. 99), that habits already formed are the basis of new acquisition; and we may remark in passing that the moral and practical importance of habit has often been written upon and can hardly be overestimated.

In all experimental work of a serial kind, habit shows itself as a *tendency to experience and report the same things.* Suppose, for example, that we wish to ascertain the least perceptible difference of tonal pitch. We begin with two identical tones, and gradually separate them in the successive experiments of the series. The observer begins with the experience and report of 'same' or 'alike.' If, now, the differences between the tones are made very small, so that the series of observations is long drawn out, the observer may get into the habit of hearing and reporting 'same'; although the tonal difference is definitely perceptible, it nevertheless passes without notice. The focal processes are here, as they are in the case of practice, few in number; but they run their course at a low level of attention; they are intrinsically obscure, and the report of them simply follows the line of least resistance. The observer is correspondingly liable to distraction from the outside; the inhibi-

tory protection is weak. Habituation is consequently to be avoided, as practice is to be desired.

Fatigue appears to be due to a sort of blood-poisoning; waste-products thrown off by the other tissues are poured into the blood-stream and there accumulate. It shows itself first of all by way of *muscular sensation* (p. 46), and soon becomes a sense-feeling; whereupon the biological theory of feeling lays hold of it (p. 84), and bids us stop work because we are suffering harm. *The feeling of fatigue, however, gives no sure evidence that the capacity of the nervous system is reduced;* the biological theory signally breaks down; not only can we work effectively, but we often do our best work, after we have begun to feel tired. We should take our cue to rest not from the feeling of fatigue, but rather from the impairment of our work, in quantity and quality, on the one hand, and from derangement of the great bodily functions, such as digestion and sleep, on the other.

In psychological experiments, fatigue *lowers the level and lessens the duration of attention*, and so, like habituation, makes against discrimination; unlike habituation, it tends also to *inhibit expression*, and thus renders the observer's report hesitating and uncertain. It is characterised, unlike practice and habituation both, by a special mental complex; a diffused feeling of lassitude which may be dominated by some local strain or pain.

In conclusion, we may mention that a great deal of controversy has centred about the questions *whether special practice has a general or a merely local effect*, and *whether general fatigue may be estimated from the results*

of some special and local test. The first question may be answered in the words of Professor Thorndike: "One mental function or activity improves others in so far as and because they are in part identical with it, because it contains elements common to them. These identical elements may be in the stuff, the data concerned in the training, or in the attitude, the method taken with it." The second question cannot yet be answered. We have every reason to think that fatigue is everywhere and always one and the same state, that mental and muscular fatigue, for instance, are identical; if we are mentally fatigued, we get rest neither by a change of mental work nor by physical exertion. But no single test or index of the danger-point of fatigue has yet been discovered.

Questions and Exercises

(1) Criticise the following statements. (A good plan would be, first, to go behind the expression to the meaning, and to make sure of that; then to take up precisely the opposite position, and see what can be said for it; and then finally to write your comments on the statements themselves.) (*a*) When two elementary brain-processes have been active together or in immediate succession, one of them, on reoccurring, tends to propagate its excitement into the other. (*b*) There is no tendency on the part of *simple* 'ideas,' attributes, or qualities to remind us of their like. (*c*) Association marries only universals. (*d*) Brick is one complex idea, mortar is another complex idea; these ideas, with ideas of position and quantity, compose my idea of a wall.

W. James, Principles of Psychology, i., 1890, 566, 579; F. H. Bradley, in Mind, xii., 1887, 358; J. Mill, Analysis of the Phenomena of the Human Mind, i., 1869, 115.

(2) How does the dominance of associationism in British psychology throw light upon the psychology of the nation itself?

(3) What sort of service could the doctrine of association render to psychology?

(4) Can you give specific reasons for the fact that too long a series of syllables throws the learner into confusion? and for the advantage that results from distribution of the series in time?

(5) Do you think that the quick or the slow learner has the better chance to retain what he has learned? Have you any evidence?

(6) Associative tendencies decay with time; yet we have said that the practised speaker drops his speech, and lets his brain incubate it. Is there not a contradiction here? Consider the two cases carefully.

(7) Can you give instances, from your own recent experience, of the working of initial and terminal inhibition?

(8) Later writers have added to the four ' laws ' of Aristotle (similarity, contrast, succession, coadjacency) various other laws: means and end, cause and effect, whole and part, thing and properties, sign and thing signified, and so on. Can you suggest any reason for these additions? Can you give an instance under every ' law,' and reduce it psychologically to our own law of association? Try to get real instances, taken from your own or your friends' experience.

(9) Trace the connection of mental processes in your own case as follows. An experimenter prepares a set of simple pictures, and arranges to show them for 3 sec. by removal and replacement of a cardboard screen. Sit at a convenient distance, and let the stimulus have its way with you; report your mental processes as they come; the experimenter writes down what you say. Try to give the facts, and not to express yourself in meanings. Do not be discouraged if the task seems, at first, to be too difficult.

(10) (*a*) Can you give any reason why your work might be unusually good when you are feeling a little tired? (*b*) What is the relation of interest to practice?

(11) State, in your own words, what the doctrine of association professes to do, and what cardinal mistake it falls into when it tries to do it.

(12) (*a*) Write out, in common-sense terms, the facts that the law of mental connection has to translate into psychological language. Next, write out, in your own words, the law itself. Now compare your formulation with that of the text: do they tally? If not, do you understand the difference? Do not be satisfied to leave any point obscure. (*b*) Show that the law of mental connection does justice, as the older ' laws ' of association do not, to the facts of § 35. (*c*) You often read in fiction of situations whose every detail makes an indelible impression; you will find one described, for instance, in Mrs. Deland's 'Philip and his Wife,' ch. xxix. Is the writer's psychology sound?

References

W. James, Principles of Psychology, i., 1890, chs. iv., xiv.; F. H. Bradley, The Principles of Logic, 1883, 273 ff.; H. Ebbinghaus, Memory, trs. H. A. Ruger and C. E. Bussenius, 1913; C. S. Myers, A Text-book of Experimental Psychology, i., 1911, chs. xii., xiii.; O. Kuelpe, Outlines of Psychology, 1909, 169 ff.; E. B. Titchener, A Text-book of Psychology, 1910, 374 ff.; M. Offner, Mental Fatigue, trs. G. M. Whipple, 1911; E. L. Thorndike, Educational Psychology, ii., 1913; E. Meumann, The Psychology of Learning, trs. J. W. Baird, 1913.

CHAPTER VII

Memory and Imagination

Inventors seem to treasure up in their minds, what they have found out, after another manner than those do the same things, who have not this inventive faculty. The former, when they have occasion to produce their knowledge, are in some measure obliged immediately to investigate part of what they want. For this they are not equally fit at all times; so it has often happened, that such as retain things chiefly by means of a very strong memory, have appeared off hand more expert than the discoverers themselves. — Henry Pemberton

§ 38. **Recognition.** — The working of the associative tendencies in the brain guarantees the revival of past experiences; it does not, so far as we have described it, guarantee that we remember. For *memory, in the psychological sense, implies recognition;* the remembered experience is not only revived, but is also familiar, comes to us as a bit of our own past history. We must try to find out what this familiarity is.

Suppose that you are entering a street-car. As you enter, you run your eyes over the line of faces before you. The first half-dozen of your fellow-passengers are strangers; their faces arouse no interest and do not arrest your gaze. At the end of the car, however, you see a friend whom you have not met, perhaps, for some time; you recognise him. Your indifference is suddenly gone; you call him by name, take a seat at his side, and begin to talk with him. What has happened?

Something has happened that, if you analyse it, recalls the first of the three connective patterns discussed on p. 161. The visual perception of your friend is supplemented by a *verbal idea*, his name. Along with the name comes a peculiar *sense-feeling*, a feeling that you may characterise as a glow of warmth, a feeling of intimacy, a feeling of sociable ease, of relaxation from the formal manner that you wear with strangers. And hardly has the feeling formed when *ideas* of sorts begin to crowd upon you, and the conversation starts. All this complexity of mental connection is there, and the whole experience may be called a recognition; but we cannot, of course, accept it at its face-value; we must still ask how much of it is essential, and whether one or more of the three factors — name, feeling, ideas — may be left out while recognition remains.

Experiment shows that *the one thing necessary to recognition is the* **feeling of familiarity.** In some cases the incoming ideas, and more especially the direct verbal supplement of the perception, the name, seem to be integral factors in the experience; but recognition is possible in their absence; and, what is more, recognition may fail in their presence; a perception may call up ideas that are objectively correct, and yet there may be no recognition of the thing perceived. *Recognition, then, is essentially a feeling, a sense-feeling of the agreeable and relaxing type, diffusively organic in its sensory character;* any perception or idea to which this feeling attaches is, by that very fact, the perception or idea of something recognised. That is as far as analysis can take us. If we care to go further, and speculate, we may

venture to guess that the feeling of familiarity is a weakened survival of the **emotion of relief**, of fear unfulfilled. There is a distinct touch of pleasurable relief, of the letting-down of strain, in the feeling as we have it; and the derivation is therefore psychologically reasonable. Moreover, primitive man was so defenceless an animal that the strange must always have been cause for anxiety; language, indeed, bears witness on the point; for 'fear' is, etymologically, the state of mind of the traveller, the 'farer' away from home; and 'hostis,' which we translate enemy, originally meant simply stranger. The bodily and mental attitude which expresses recognition thus seems to be still the attitude of going off guard, of ease and confidence. In our everyday life, as you will readily see, the tinge of sense-feeling may be overlaid by the heavier colours of some positive emotion; we may recognise an acquaintance with whom we are heartily angry, or whose conduct has brought us sorrow; primitive man himself recognised his enemies! But in the laboratory, where these disturbing influences are ruled out, the nature of the feeling of familiarity comes clearly to light; intrinsically, recognition is always an agreeable and relaxing experience.

In everyday life, again, our *recognitions may be of all degrees of definiteness*. They are indefinite when the feeling of familiarity comes up alone, without the name or the associated ideas; when, for instance, we pass someone on the street, and say to our companion "I'm sure I know that face!" and so pass on. They are somewhat more definite when the perception is supple-

mented by a general name. As we glance down the line of strangers in the street-car we may think to ourselves " doctor, — farmer, — commercial traveller, — soldier "; the feeling of familiarity then represents our recognition of the class. Lastly, they are definite when one or more of the contributory factors — the name, the organic stir of the feeling, the incoming ideas — carry an unequivocal reference to our past experience, mean some definite incident of our past life. We chance to overhear a name in conversation; and " Why," we break in, " that's the man I went up the Gross Glockner with in '98! " — the recognition is definite. *There is no real psychological difference* between the three cases; the difference lies only in the range of meaning which the contextual processes carry.

There is a psychological difference, however, between all the cases of recognition which we have hitherto mentioned and certain other cases: a difference *between direct and indirect recognition*. The recognition is direct when the perception at once, of itself, calls up the recognitive feeling. It is indirect when the feeling attaches, not directly to the perception, but to some idea or some other perception connected with the given perception. We pass a stranger on the street; but we are suddenly hailed by a familiar voice; the recognition of the voice makes us look hard at the stranger's face, and we then recognise him as an old college friend. We try to find our host's face in a group-photograph of schoolboys, and we are wholly puzzled to identify him; the face is pointed out in the picture, and we turn from it to the mature face with which we are familiar; the photograph

grows more and more like, the more closely we compare the two; presently we get a sudden conviction of their identity, the recognition of the photograph is complete, and we wonder that we could have failed to pick the right boy at the outset. In both these instances, *recognition hinges on the feeling of familiarity;* but something else happens, something that reminds us of the second connective pattern of p. 161, where an idea is read into a perception, or the perception resolved into an idea. There are times, too, when recognition is halting and partial, when the feeling of familiarity alternates with a feeling of strangeness; in such experiences the play of associative tendencies may be extremely complex.

§ 39. **Direct Apprehension.** — We saw on p. 120 that meaning, which was at first a fringe of mental processes, a contextual setting of some bit of bare experience, may in course of time be carried by nerve-processes which have no mental correlates of any kind. The same thing seems to hold of recognition. We do not, in strictness, 'recognise' the clothes that we put on every morning, or the desk at which we are accustomed to write; we **apprehend** them, directly, as our clothes and our desk; we take them for granted. The feeling of familiarity, the feeling of being at home with our own things, changes first to something that is still a feeling, though weaker and more nebulous; to something that we may describe as an 'of-course' feeling, which is still some distance away from sheer indifference. As the days and weeks go on, this of-course feeling itself dies out; the stimuli no longer have power to arouse a feeling at all, and the

organism faces the habitual situations without any organic stir. We apprehend the clothes and desk *as* ours, precisely as we perceive the tree and the piano *as* spatial (p. 115). In experiments on the recognition of greys, the author has reported positively that a particular grey had been seen before, without being able to find anything whatsoever, in the way of verbal idea or kinæsthetic quiver or organic thrill, that might carry the meaning of familiarity; the brain-habit just touched off the report 'Yes,' and that was all that could be said.

That brain-habit, however, had a psychological history behind it; and the history shows itself whenever our direct apprehension is in some manner disturbed or prevented. We reach out to our inkstand, and find that the pen which always lies in it has disappeared; or we glance round the breakfast-room, and notice that a picture which always hangs upon a certain wall has gone. We have not been wont to recognise the pen and the picture; they were just matters of course. Now that they are absent, however, the situation jars upon us; we have a pronounced feeling of helplessness or of displeased surprise. That is as far, perhaps, as ordinary observation goes; but there is really more to be observed. For at the moment of disturbance, before the disagreeable feeling has arisen, the 'of-course' feeling springs up in unusual strength; it is as if, for a brief space, we reverted in imagination to a true recognition of the missing object. And even after the displeasure is there, we may go back more than once to the familiar state of affairs; we can't believe, as we say, we can't trust our

eyes, the thing has always been in that place; so that the glow of recognition alternates with the dominant feeling. In a word, *the disturbance of apprehension has brought back to life certain stages in the past history of the brain-habit*, stages in which the nerve-processes had as their correlates the mental processes that make up the feeling of familiarity.

This passage of recognition, from the characteristic feeling of familiarity through the weaker of-course feeling into a sheer brain-habit or nervous set, illustrates the descending phase of a progression which is typical in psychology, and which is summed up in the **law of mental growth and decay**. We are constantly finding that a mental formation, a particular complex of mental processes, is at first thin and scant, then enriches itself by various supplementary processes, and then again thins out or tails off — finally, into mental nothingness; and recognition illustrates the downward half of the curve. The law was strongly insisted on by the late G. H. Lewes, an author who wrote largely on psychological topics, but who is better known to the general reader from his association with George Eliot. "This process," Lewes tell us, "underlies all development. The voluntary actions become involuntary, the involuntary become automatic; the intelligent become habitual, and the habitual become instinctive. It is the same in the higher regions of intellect: the slow acquisitions of centuries of research become condensed into axioms which are intuitions." We have already met the law in our discussions of attention and meaning; and we shall meet it again when we come to discuss action.

§ 40. **The Memory-Idea.** — But where, all this while, is the memory-image? If you had been asked, before you read the foregoing paragraphs, what happens when you recognise somebody or something, you would probably have replied, as the associationists reply: 'The present sight of the object calls up an *image* of that object, by the law of similarity; then the image or idea is compared with the perception, and the two are found to agree; and this agreement is what I mean by recognition.' If it were then objected that observation fails to show any such idea or image, you would perhaps have said: 'The whole thing takes place so quickly that the factors cannot ordinarily be distinguished; but all the same that is what must happen.' And so you would have kept your faith in the image.

Such an image may, in fact, appear. It may appear in the cases of halting and partial recognition that we referred to on p. 181; but it need not necessarily appear even there; its intervention is, indeed, as rare as the third type of mental connection, the clean-cut succession of p. 161. You will perhaps get at the heart of the matter most easily if we lay down, at once, the general principle that *no imaginal process or complex of imaginal processes is in its own right a memory-idea.* Even if the simple images which compose it are different from sensations (p. 77), it must still be called a complex image, and nothing more; not an idea of memory. A complex of imaginal processes becomes, *is made into*, a memory-idea by an attendant feeling of familiarity; just exactly as a perception, a complex of sensory processes, is made into a recognition of something by the

same feeling of familiarity. So that *an idea, in order to be a memory-idea, must bear the memory-label;* and the label will be either the sense-feeling of familiarity proper, or else some weaker and more fleeting feeling of the ' of-course ' kind. It is true, again, that an idea which has lived through this history may be taken *as* a memory-idea when the label has dropped away; but even then it is a memory-idea, not in its own right, but in right of the brain-habit behind it. No group of images, taken out of its mental setting or removed from the directive pressure of a brain-habit, can be known as a memory; it might be hallucination or dream or imagination or anything else; it is just a group of images.

Our quarrel with popular psychology goes further still. *The whole notion that a memory-idea is a copy of past experience is wrong;* the idea may copy the perception, but it need not; and usually it does not. You remember that, after we had formulated our own law of mental connection, we introduced the catch-phrase ' marriage by proxy '; and you remember why. What, now, is the essential thing about a memory-idea? Not, surely, that it should copy past experience, but that it should *mean* past experience. Our individual equipment of images is so variable (p. 139) that we should be very badly off if we were limited, in what we remember, to copies of our perceptions; *A*, who has no visual images, could then remember nothing that he had seen, and *B*, who has no auditory images, could remember nothing that he had heard! Such are the straits to which popular psychology must logically reduce us. In point of

fact, *A* remembers well enough what he has seen; only, the visual parts of his experience are translated into other modes, perhaps verbal-motor. In that event a verbal-motor image, set in the right context and accompanied by a feeling of familiarity, may mean for *A* some visual object that he perceived so many years since. It goes flat against common sense to assert that a verbal-motor image is the ' memory ' of the visual perception; and yet that is just what the verbal-motor image, in its present setting, actually is.

This translation of perception into imagery of another mode has curious consequences. I may declare positively that I remember having heard Patti sing forty years ago, when all that I really remember is the statement itself, the form of words which carries my meaning. Nay more, if my mind is of the imaginal type, I may have taken my cue from the verbal statement, and have conjured up a mental picture of the performance, a picture now so familiar that I could swear to the pink dress, — were it not that a contemporary notice writes it down as cream! *Words often repeated are in this way highly deceptive;* and there is good psychology in the story of the traveller who told his romantic tales so often that he finally believed them himself. Many of us, if we would but confess it, remember things that happened before we were born; the account of them was impressed on us in childhood, and was later bodied forth in images; and now their ideas bear the memory-label. Here, then, is one source of the ' untrustworthiness ' of memory, which is at the same time a possible source of the Platonic doctrine of reminiscence.

§ 41. **Illusions of Recognition and Memory.** — Psychologically, an illusory memory is a memory, just as an illusory perception is a perception. We speak of *illusion* when our experience fails to square with what, from our knowledge of external circumstances and of other like experiences, we might have expected; the distinction is therefore practical, not scientific. We shall avail ourselves of it, partly for convenience' sake, and partly because certain cases of illusion offer special problems to the psychologist.

Most of us, probably, have an occasional acquaintance with what is called **paramnesia** or wrong recognition: a definite 'feeling that all this has happened before,' sometimes connected with a 'feeling that we know exactly what is coming,' — a 'feeling' which persists for a few seconds and carries positive conviction, in spite of the fact and the knowledge that the experience is novel; Dickens gives an instance in *David Copperfield*. Various explanations have been offered of the phenomenon. It occurs most frequently after periods of emotional stress, or in the state of extreme mental fatigue; that is, at a time when the associative tendencies in the brain are abnormally weak; and it seems to depend, essentially, upon a disjunction of mental processes that are normally held together in a single state of attention. Suppose the following case: you are about to cross a crowded street, and you take a hasty glance in both directions to make sure of a safe passage. Now your eye is caught, for a moment, by the contents of a shop window; and you pause, though only for a moment, to survey the window before you actually cross the street.

Paramnesia would then appear as the feeling that you had already crossed; the preliminary glance up and down, which ordinarily connects with the crossing in a single attentive experience, is disjoined from the crossing; the look at the window, casual as it was, has been able to disrupt the associative tendencies. As you cross, then, you think 'Why, I crossed this street just now'; your nervous system has severed two phases of a single experience, both of which are familiar, and the latter of which appears accordingly as a repetition of the earlier. The illusion will evidently be strengthened if, as is only natural, the casual look at the window does not recur to you. This is an imaginary case, simplified for clearness of exposition; and we cannot be at all sure that the explanation which it suggests is correct; for cases of paramnesia cannot be realised at will, and the nervous condition that leads to them is not favourable to scientific observation; but something of the sort must take place.

Illusions of memory have been touched upon on p. 186. We may remember something that never happened; we may remember something that happened, but could not have happened to us; we make all kinds of mistakes in memory; we fail to remember a great deal that has happened. These chances of error are inherent in the laws of associative tendency, and in the character of the memory-image. There is one illusion, however, that requires a word of comment: the illusion of the '**good old days**,' the tendency of every man past middle age to be *laudator temporis acti se puero*. This has often been referred to the principle that we remember pleasurable ex-

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periences better than unpleasurable; we are so constituted, it is said, that the disagreeable events of our past life are forgotten and the agreeable are conserved in memory. The principle, however, has never been established, and there is some experimental evidence against it. In all probability, *the illusion is due to many contributing factors*. First of all, our nervous system takes its general set in childhood; it is then that we acquire standards of right and wrong, of social position, of daily intercourse and occupation. In so far as later experiences interfere with this set, the old order will be preferred. Secondly, our self-centredness (p. 2) leads us to idealise our past self; we think of ourselves as more important, more heroic, more dominating, more regarded, not only than we were, but also than any youngster of our sort could possibly have been; autobiographies, however truthful in intention, bring out the point with sufficient clearness. So we contrast our present struggles with the triumphs of an unreal past. Thirdly, the old days were, in one sense, really happier for us than the new; happier because we had no responsibilities, because there was a generation of adults to whom we could appeal; and we are very prone to confuse our own greater comfort with a better status of society. These are obvious considerations, but they and things like them are enough to account for the illusion.

§ 42. **The Pattern of Memory.** — Psychology cannot yet offer any adequate description of the pattern that mental processes display, the arrangement that they fall into, when we are remembering. Memory, as we

are all aware, may occur in the state of primary attention, when we call it remembrance, or in the state of secondary attention, when we call it recollection. Something may be said under both heads; but our account must be largely figurative and conventional.

Let us take **remembrance** first. There seems to be, as it were in the background, something that holds us down to a particular circle of ideas, or, in other words, that limits the play of ideas to some particular situation. This something may be a group of contextual mental processes, or may be merely a nervous disposition; we shall have more to say of it later (§ 48). Upon the background move mental processes of extraordinary instability, all of them tinged more or less strongly by the feeling of familiarity. Attention is labile and fluid; the focus is occupied now by visual or other imagery, now by scraps of kinæsthesis, and now by organic or verbal processes that carry a personal meaning and reference; and the whole mental stream contracts and expands, pauses and hurries, and shows the most abrupt changes of direction. All of which is sadly vague! but let the reader catch himself 'reminiscing,' and he will realise the general truth of the description, and also the extreme difficulty of making it more concrete.

In **recollection**, the background is filled by the intent to recall; and this intent may, again, be constituted by contextual mental processes or carried by a nervous set. The course of recollection may then be characterised as *a reconstruction along the lines of least resistance.* Some bit of imagery, some form of words comes up, and is at once met, so to say, by the feeling of familiarity.

Further ideas present themselves, in more or less disorderly fashion, and the feeling plays upon them, accepting here and rejecting there, serving throughout the experience as a court of final appeal. Some of the ideas are directly recognised; some seem to force our acceptance by their vividness; some pass muster because familiar verbal ideas, names or phrases, are connected with them. Some, that leave us in doubt as they arise, are shelved for the time, to be judged later on, when the positive acceptances are done with; and they are likely to be judged in the light of these acceptances, and of our general knowledge of the situation which we are trying to recall; even a weak recognitive feeling is enough to give them status. In and out among these ideas run threads of kinæsthesis, which imitate or repeat fragments of the original experience. There is thus a veritable tangle of processes; the situation is not reproduced in image, and its items read off in logical order; it is rather reconstructed; and the reconstruction follows, as has been said, the lines of least resistance at the moment. Yet we are so accustomed to the logical order of speech that our narrative, as recollection proceeds, may give but little hint of the tangled interplay of ideas; at most we may correct ourselves at points, or remark that just now we left something out. Observe the flow of mind itself, and the disorder is apparent.

We may say, then, that *the pattern of memory is a discursive movement within fixed boundaries;* the boundaries are given by the set or background, as we have named it, by the fact (in other words) that we are recalling a particular situation or event; and the discur-

siveness reveals itself in roaming of attention and shift of ideas, which imply a variable activity of the associative tendencies. The characteristic processes are the *feeling of familiarity* and the *imitative kinæsthesis.*

§ 43. **Mnemonics.** — Rules for remembering, tricks of memorising, were considered of great importance in the ancient world; oratory was highly esteemed; and no orator before the time of Augustus would have ventured to use notes. As the art declined, these rules were less and less regarded; we hear practically nothing of them between the first and the thirteenth centuries of the present era. From that date, however, interest in *artificial memory-systems* has never died out; they have been recommended for sermons, for lectures, for disputations, for public speeches, for the learning of foreign languages, for examinations, for practically every occasion in which memory is employed, as well as for the improvement of memory itself.

The great principle of mnemonics is that you remember the novel and the disconnected by bringing it into arbitrary relation to the familiar and the connected. Everybody, for instance, is thoroughly at home in his own house; the positions of the rooms are known, and their employment for the necessary purposes of the family holds them together. Suppose, then, that you are to deliver a speech, and that the speech has eight principal points. You think of yourself as entering the house: the first point you deposit in the hall, the second in the drawing-room, the third in the library, the fourth in the back hall, the fifth in the kitchen, the sixth in the pantry, the

seventh in the dining-room, the eighth on the upstairs landing. You think of yourself as making the separate points in these different places; if possible, you invent some fanciful connection between the point and the place where you deposit it; if, for example, your second or drawing-room point is an historical reference, you might think of 'drawing a hiss' from your audience; anything will do, provided it is the sort of thing to stick! This local or *topographical way of memorising* has always been popular; it is said that our ordinary phrases 'in the first place,' 'in the second place,' derive from it. *Number-alphabets*, in which certain letters stand for certain figures, are also much employed; dates, physical constants, statistical numbers, may thus be memorised. The *rhythm of verse* has been appealed to; if you want to remember the seven cities that laid claim to the birth of Homer, you learn the hexameter-line 'Smyrna, Chios, Colophon, Salamis, Rhodos, Argos, Athenæ'; and you are helped — if further help is wanted — by the pattern of the initial letters SCCS-RAA.

Such devices have a special and temporary utility; we have all taken examinations, and probably we have all had recourse to them on a larger or smaller scale. Many of us have paid the not infrequent penalty; we have remembered our mnemonic doggerel, but have forgotten the key to it, and so have forgotten the events or numbers that it was meant to recall; there is always that danger. *No scheme of memory-aids that is universally applicable and universally reliable has been or can be discovered;* there is no royal road to learning. In so far as a mnemonic rule follows the laws of associative

tendency, as for many minds the local or topographical rule seems to do; or in so far as it chimes with some peculiarity of individual thinking; in so far, it will be of practical service in daily life; that is the most that can be said.

§ 44. **The Idea of Imagination.** — We think of memory as reproducing the old, and of imagination, no less positively, as producing the new; the very word *poet* means the maker, and the word *artist* means the fitter or joiner. Imagination cannot, of course, give us new qualities of experience; we cannot imagine a new colour, different from all known colours, or a new sensation — say, a specific sensation of electricity — different from the known sensations of skin and underlying tissues. *Imagination does, however, give us novel connections;* and experiment shows that an idea comes to us as imagined only if it comes as unfamiliar, with the feeling of novelty or strangeness upon it.

In real life, the **feeling of strangeness** is soon swamped by alien feelings, by the artist's joy or pride, dissatisfaction or despair; in the laboratory, it appears strongly by itself. The observers speak of a feeling of novelty, of personal detachment, of creepiness, of weirdness, of something out of the ordinary, of peculiar discomfort. Compare this list of terms with a sentence from Lafcadio Hearn's last book: "The outward strangeness of things in Japan produces a queer thrill impossible to describe, — a feeling of weirdness which comes to us only with the perception of the totally unfamiliar"; there is no doubt that the same experience is intended. It is, at

first thought, a little surprising that an idea of imagination, which after all derives from the observers' own experience, and which is obtained under the rather tame and colourless conditions of a psychological experiment, should have so strong a tinge of feeling. Yet we need not be surprised; for we have already learned that the novel stimulus has power to compel the attention; it stands alone and unrelated; and for that reason it startles and arrests us (p. 94). If the ideas aroused in the laboratory mattered, if they were practically important for their owners' careers, then the feeling of strangeness would, as we have said, be overborne by other feelings; but they do not matter, and so can be developed and observed for what they are.

An idea, then, becomes or *is made into* an idea of imagination by its mental setting, which is this feeling of strangeness, the opposite of the feeling of familiarity. As regards the nature of the feeling, we may guess that it is *the modern representative of primitive man's anxiety and uneasiness in face of the unknown*, an echo from the time when the new was the dangerous (p. 179). If the idea is often repeated, the feeling wears off, and is replaced by a directive brain-habit; we still take it *as* an idea of imagination, but we do not re-imagine it. If it is still further repeated, it ceases even to be taken as imaginative, and becomes one of the habitual images that we spoke of on p. 77.

There is a second difference between *the idea of imagination* and the idea of memory: the difference, namely, that the former *cannot be replaced by another mode of imagery*. An idea of imagination must not simply mean

something new; it must *be* something new. We know that images of imagination are not indispensable to artistic work; painters do not necessarily possess visual imagery (p. 141). Where the idea of imagination does exist, however, it keeps its original form. The French mural painter Puvis de Chavannes used to contemplate, for days together, the bare spaces that he was to fill; 'wasting time,' a friend told him, and received the reply "I have to see my picture before I can paint it." In a case like this, the mental picture — though it may be modified as the actual colours are laid on, or as new outlines suggest themselves to the painter — must, so far as it furnishes a guide and model, hold its form and colour-scheme almost as fixedly as a perception; otherwise it would be useless. So a man may be a very good musician, and possess no auditory images. Yet Beethoven composed his Ninth Symphony in 1823, when he had long been deaf; and he could not even have helped his mental ear by the kinæsthesis of singing, since without special education the deaf soon lose control of the larynx. In his case, therefore, the auditory imagination must not only have held good, but must also have grown more complex and more keenly discriminative, up to the very end. No doubt, he was aided by the eye; the symphony grew on paper, a theme at a time; and, no doubt also, he used his general knowledge of what would sound aright and what would not; he was a practised composer. But, when all allowance is made, his main reliance must have been on auditory imagery, and this must have remained as stable as auditory perception. Such instances prove that *the idea of imagina-*

tion runs a different course from the idea of memory. The memory-idea is common to all minds; it persists as meaning, under the limitations of imaginal type and the general laws of associative tendency. *The idea of imagination seems to depend rather upon special endowment;* it persists in kind, also under the limitations of imaginal type; and it is conserved by some special grouping or 'convergence' of associative tendencies (p. 158). We do not hesitate to describe a man as 'wholly lacking in imagination,' though we should look upon a total lack of memory as a sign of mental incompetence; and the common phrase brings out, well enough, this personal or idiosyncratic character of the idea of imagination.

§ 45. **The Pattern of Imagination.** — Imagination, like memory, may occur in the state of primary or of secondary attention. In the former case we call it receptive, in the latter case constructive imagination.

What happens in **receptive imagination** is, in principle, very simple. We are confronted by new perceptions or ideas, and we supplement these experiences by *complex images of the appropriate kind.* We read, for instance, a traveller's account of an African forest, and we picture the forest as we read; we receive the score of a new song, and the melody sings itself to us as we run our eye over the printed notes; we stand upon an historic site, and rehearse in image the scenes that it has witnessed. A certain definite direction is given to our ideas by the presented stimuli; then the ideas, as they come in their predetermined order, are supplemented in this imaginal way.

The characteristic *feeling of strangeness*, in such cases, is often interfused with an experience which might, at first sight, seem incompatible with it; the '*feeling*' *of our own concernment* in the imagined situation. We have a natural tendency to feel ourselves into what we perceive or imagine. As we read about the forest, we may, as it were, *become* the explorer; we feel for ourselves the gloom, the silence, the humidity, the oppression, the sense of lurking danger; everything is strange, but it is to us that the strange experience has come. We are told of a shocking accident, and we gasp and shrink and feel nauseated as we imagine it; we are told of some new and delightful fruit, and our mouth waters as if we were about to taste it. This tendency to feel oneself *into* a situation is called **empathy**, — on the analogy of sympathy, which is feeling *together with* another; and empathic ideas are psychologically interesting, because they are the converse of perceptions: their core is imaginal, and their context is made up of sensations, the kinæsthetic and organic sensations that carry the empathic meaning. Like the feeling of strangeness, they are characteristic of imagination. In memory, their place is taken by the *imitative* experiences, which repeat over again certain phases of the original situation.

What happens in **constructive imagination** is not so easy to say. Genius is defined sometimes as the capacity of doing great things without effort, and sometimes as the capacity of taking infinite pains; and constructive imagination, in the same way, is represented now as a native gift that finds rather than seeks expression, and now as a sort of skilled labour, a matter of planning and

moulding and constructing. There is probably truth on both sides, and a degree of truth that varies with the individual make-up of the artist; in general, however, there is more hard work and less inspiration than is usually supposed. The poet or the inventor starts out with a more or less definite plan or aim or ambition; and the plan persists, if only as a nervous disposition, to determine the course of his ideas. It also helps to initiate the imaginative complex, the first clue to which seems in fact to come, at least ordinarily, as an inspiration, a happy thought; some external situation, or some grouping of the associative tendencies that is active at the moment, touches off the disposition, and the initial idea flashes into mind. Whether this first idea is crude or complete, and whether the stream of later ideas is broad or narrow, these things depend altogether upon circumstances. Now, at any rate, begins the stage of skilled labour; the idea is worked upon and worked over; the plan decides what shall be accepted, what rejected, what put aside for another trial; we are reminded of the course of recollection, — only that rejection, active as it is in memory, is still more to the fore in imagination, and construction is more critical than reconstruction. Here and there other happy thoughts may crop up; but in essentials this stage of hard work continues, until the idea attains its final expression in objective terms, in the words of the poem, for instance, or in the effective machine. Meantime, there have been all sorts of feelings. The imaginative ideas bring with them their own feeling of strangeness; but this may be overwhelmed by the joy of success or the irritation of failure;

and these feelings may themselves alternate, swinging from extreme to extreme. Meantime, also, there have been all sorts of empathic experiences, which have formed about the focal processes, vivifying and personalising the partial products of the constructive effort; and they too find their natural term in the actual accomplishment of the imaginative task. Figurative, again, all this, and lamentably far from scientific accuracy, — but, in broad outline and on the average, we may hope that it is true to the psychological facts.

How, now, does the pattern of imagination compare with that of memory? We saw that the memory-pattern is that of discursive movement within fixed boundaries, the limits set by the fixity of the past occurrence which is remembered. Imagination, on the other hand, is a more or less steady flow, in a single direction, from the fountain-head of disposition; there are no limits of any kind, save those of individual capacity and experience; but the course is determined by the initial plan or ambition. *Memory is discursive movement within fixed boundaries; imagination is progressive movement from a constant source. Memory is characterised by the feeling of familiarity and by imitative kinæsthesis; imagination by the feeling of strangeness and by empathy.*

Questions and Exercises

(1) Memory, like recognition, may be definite or indefinite, direct or indirect. Can you give instances from your own experience?

(2) Suppose that you were required to write a defence of cramming. Could you find materials in these two chapters?

(3) Memory fails as old age comes on; it decays, as we say, in old age; and the course of decay is well-marked and uniform. Can you give any account of it? And can you explain the course from statements made in these two chapters?

(4) Do you think that memory can be improved? Be sure, before you answer, that you have read a clear meaning into the question. Give reasons for your answer.

(5) It has been said that we have no memory, but only memories. In what sense or senses is this statement true?

(6) Memory has been described as a storehouse of ideas, as a power to revive perceptions, as a universal function of organic matter, and as decaying sense. Try to realise clearly what the users of these phrases had in mind; say what you can in their favour; show in what respects they are inadequate to the psychology of memory.

(7) Can you give instances of empathy, from your own experience: in the reading of history or fiction, in the viewing of architecture or landscape, in watching an actor or a musician or an athlete, in day-dreaming? Describe as accurately as you can the different 'feel' of empathy and sympathy; do not be satisfied with meanings.

(8) (*a*) Read Hawthorne's preface to *The House of the Seven Gables* and G. P. Lathrop's Introduction. What light do they throw on the mechanics of constructive imagination? (*b*) Read Poe's essay on *The Philosophy of Composition*. Is the writer's psychology sound? Do you take him to have been wholly sincere? Why? Be definite.

(9) It has been suggested that the pattern of constructive

imagination might be studied in the first drafts (where the manuscripts have been preserved) of poems, especially of lyric poems. What have you to say to the plan?

(10) Has imagination, in the ordinary sense, any place in science? Can you justify your answer in psychological terms?

(11) A recent writer declares that " the idea of a centaur is a complex mental picture composed of the ideas of man and horse." The statement is unpsychological in the highest degree. Why?

(12) What have you to say, from what you have learned of receptive imagination, (*a*) of book-illustrations in general, (*b*) of Cruikshank's and Seymour's and Browne's illustrations of Dickens, and (*c*) of an illustrated edition of George Meredith's works?

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CHAPTER VIII

Instinct and Emotion

Ie considere que, dés le premier moment que nostre ame a esté iointe au corps, il est vray-semblable qu'elle a senty de la ioye, & incontinent aprés de l'amour, puis peut-estre aussi de la haine, & de la tristesse; & que les mesmes dispositions du corps, qui ont pour lors causé en elles ces passions, en ont naturellement par aprés acompagné les pensées. — René Descartes

§ 46. **The Nature of Instinct.** — We left the sense-feelings a long time ago (§ 18), though we have made occasional reference to them and to emotion in recent paragraphs. Now we return to the feeling-side of mind; but we must begin with an account of **instinct**, which is related both to emotion and to action.

Instinct and reason are familiar catch-words of popular psychology. Animals are said to act 'on instinct,' while man, at any rate in his specifically human capacity, acts 'by reason.' The terms, as thus used, are not descriptive but explanatory. Just as a mental connection is supposed to be explained by similarity or contiguity of ideas (p. 146), so a particular activity or performance is supposed to be explained when we have labelled it 'instinctive' or 'rational.' But what is instinct?

If we observe the behaviour of the lower animals, we find two sorts of response to stimulation: the one points to the working of an inherited nervous mechanism, the other

depends upon nervous connections formed during the life-time of the individual. The second year's bird builds the nest of its species, though it has never built a nest before; the cage-reared migrant beats its wings against the bars at the approach of winter, though it has never taken flight to the southward. Here is behaviour that we must refer to innate nervous tendencies, to the working of an inherited nervous mechanism. If, on the other hand, the parent birds come to the window-sill and take crumbs from our hand, we are in presence of behaviour of the second type. The difference, in the broad, is clear enough; only we must not press it too far. The second year's bird, we say, builds the nest of its species; but one nest is never quite like another; something will depend upon the situation. Contrariwise, the birds would not come to the window if they had not an innate attraction to food, or a natural boldness of disposition, or a native tendency to flock with their fellows. The two sorts of behaviour can be distinguished; but they are likely to enter together, though in unequal degree, into one and the same performance.

Instinct, *now, is the general name for these innate tendencies to behaviour.* The word explains nothing; it is the business of science to find out what the inherited nervous mechanisms are, and how they work; but though nothing is explained, we are helped by the term toward a *classification* of the facts of behaviour. All of man's conduct will be instinctive, for example, that can be shown to issue from innate nervous tendencies; and further, all of man's conduct will be *in so far* instinctive as innate nervous tendencies can be shown to

have a share in producing it. *How large a part, then, does instinct, in this sense, play in the life of man?* Not a question that can be answered offhand! For you might argue, as has been argued, that because man is the most flexible and adaptable and teachable of all animals, because he lives in all climates and thrives in the most varied conditions of life, therefore he has but few instincts. Or you might argue that, since man has undergone more change and has progressed further than any other animal; since his evolutionary history, though not longer in time, is richer in biological incident than that of the other animals; therefore he must have a great variety of instincts, or at any rate a great variety of inherited nervous mechanisms that help to guide and shape his conduct. What are the facts?

If we try to work out a rough list of human instincts, we find, at the lower end of the scale, a number of *definite modes of response to particular stimuli;* such things as coughing, sneezing, swallowing, smiling, threading our way in the street, beating time to music; or, in the baby, such things as sucking, clasping, biting, turning the head aside, standing, creeping, walking, crying, vocalising. At the upper end of the scale, we find *gross general tendencies:* the tendency to take the world of perception as a world of real things in outside space (p. 115); the empathic tendency to humanise and personalise our surroundings (p.198); the social tendency that makes us imitative and credulous; the tendency to classify everything in pairs; the tendency to try things out, which is always at war with the tendency to let things be. These tendencies, and others of the same

character, represent directive pressures laid upon the organism, more strongly upon some individuals and more weakly upon others, but in some measure upon all; they are realised or expressed on very various occasions, and with wide differences of mental accompaniment. We have spoken of some of them already; and instances may be found for the looking. Take the empathic tendency: what lover of books has not shifted the place of certain volumes on a shelf, because he could not bear to put good and bad, sound and trivial, side by side, — as if the *books* would feel the incongruity? Take the social tendency: we all tend to pay respect to fashion, even the silliest; we all tend to believe what we see printed in large headlines; we are all gullible, if only the cheat speaks to us in good English and appeals to our habitual standards of living. The tendency to classify by pairs shows not only in the dogmatism of uneducated persons — an action must be positively right or wrong, a man must be positively innocent or guilty — but also in the structure of systems of philosophy, in the distinctions of active-passive, subject-object, body-mind, thing-attribute, appearance-reality, and so on. The tendency to try things out is largely responsible both for the play of the child and the research of the man of science; read Andrew Lang's story of the first radical! The tendency to let things be, the conservative tendency, is on its side largely responsible for the laziness of a life of routine.

Between these extremes lie *the instincts that are so called in our ordinary speech*, and that you would probably have thought of, if you had been asked to give

examples of human instincts: such things as fear, love, rivalry, jealousy, pugnacity, bashfulness, self-assertion, various lines of 'interest.' All these names, and many like them, stand for inherited nervous dispositions which are realised or expressed in emotion. They too are differently combined, and exist in varying degree, in different individuals; and they too are common, in some measure, to all humanity.

Can we now say how man compares, in the matter of instinct, with the lower animals? James commits himself so far as to declare that "no other mammal, not even the monkey, shows so large an array." The statement is probably true, if we mean by instinct, not a fixed and unchanging mode of response to the given stimulus or situation, but rather an equipment of innate tendencies that may form the basis of all sorts of response; an all-round readiness of behaviour, as it were, such that no stimulus or situation finds us wholly unprepared, while yet the preparation is not so narrow and definite as to force us into special and invariable response. Civilised man 'reasons' always on the basis of his instinctive tendencies; his 'instincts,' on the other hand, are in general less absorbingly possessive and less close-knit than those of lower forms of life.

§ 47. **The Two Sides of Instinct.** — If instinct is the general name for the innate nervous tendencies to behaviour, then the detailed study of instinct belongs to physiology and general biology. The psychologist is concerned with it only in so far as the innate tendencies guide and form the stream of thought. There is, how-

ever, another side to instinct, which makes it a matter of direct psychological observation; the touching-off of an instinctive response may be accompanied by mental processes, by sensations and feeling. We must say something of instinct in both relations; and we look at it, first, from the **biological** point of view.

The list of instincts given on pp. 205 ff. includes tendencies of very different kinds, simple and complex, variable and constant. Sweeping statements are therefore dangerous; we must be careful to guard our generalisations by giving instances. That premised, we note, to begin with, that *the innate tendencies are rarely perfect*, completely ready for action, at birth; they ripen as the organism developes. The child does not learn to walk, or the bird to fly, in any strict sense of the word 'learn'; the innate tendencies settle to their perfect work as time goes on. We note, secondly, that the tendencies may *ripen at very different levels of individual development;* the culmination of sex-interest at adolescence, the appearance of bashfulness in the child of three or four years, the lack of fear in the new-born babe, are cases in point. Thirdly, they are extraordinarily *persistent*. Our instincts, no doubt, wax and wane; but they change far less than their outward expression would indicate. The boy, we say, goes through the collecting stage, and therewith an end; but do not grown men too collect, if they have time and money? The little girl with her doll is the later mother with her child; and the play of the child persists in the technical play of the gambler and the experimental essays of the man of science. Fourthly, they are *by no means harmonious among themselves*. In many

animals the instinct to crouch motionless conflicts with the instinct to flee from the object of fear, and you may see them obeying now the one and now the other. Curiosity conflicts with alarm: watch a young child on its first introduction to a dog or a beetle! The sparrow is at once audacious and cautious, bold and timid; and every human adult — despite the song in *Iolanthe* — is both conservative and radical. Fifthly, they are looser, have (so to say) *a greater freedom of play*, than is commonly supposed; and this in two directions; the same response may be touched off by situations that have only a general resemblance; and, conversely, situations that seem to be identical may touch off responses that show a good deal of difference. In briefer statement, like stimuli may call out the same response: we smile from happiness or from superiority; and the same stimulus repeated may call out responses that are hardly even like: the extreme case is, perhaps, our crying or laughing for joy. Sixthly, they are *liable to be checked, turned aside, inhibited, by acquired nervous tendencies;* habit is not only second nature, but may also overcome nature. A chick pecks at an humble-bee, and pays the penalty; thereafter it rejects yolk of egg. A pike in an aquarium, separated from minnows by a glass screen, struck repeatedly at its natural prey and bumped its head; when the screen was removed, the minnows were left undisturbed. If a sheet of glass is placed before the eyes, and a rubber-tipped hammer springs up and hits it, you wink, perhaps, for the first hundred times; but you can presently inhibit the wink. This liability to inhibition is, of course, more obvious in the case of the more

complex tendencies. Seventhly, they are *liable to specialisation.* A bird builds its nest in a certain suitable place; and then, though the site may become increasingly dangerous and exposed, persists in building there again, year after year. The routes that various birds follow in their migratory flight south and north show the same kind of specialised set. Eighthly and lastly, the more complicated tendencies may, especially in the case of man, be *broken up into partial tendencies;* and these partial tendencies may then form connections of the most varied sort with acquired tendencies. A father strikes a blow in defence of his child: love and hate and possibly fear are involved; if the deed is done in public, such social instincts as love of approbation and fear of ridicule may come in; all these instincts are concerned, and yet the father would give you his reasons for the blow! Civilised man, we said, always 'reasons' on the basis of his instinctive tendencies; we had better have said that he reasons on the basis of various fragments of instinctive tendency, disjoined from their original connections and recombined for an immediate purpose.

So much for the biological side of instinct. We have no space for a longer treatment; though, indeed, if you go to the larger works, you will find little more that is definite and firmly established; the detailed study of the innate tendencies has hardly begun. If we turn now to the **mental accompaniments** of instinctive response, we find ourselves in even worse case; we know practically nothing. It is clear that *some of the more limited responses have a characteristic mental correlate* — think of

coughing, sneezing, smiling — which may, however, according to circumstances, be either vivid or so obscure as to escape notice. It is clear, again, that *the empathic tendencies are likely to be characterised by more or less massive complexes of organic sensation;* and it is perhaps true that this **organic surge** represents the mental aspect of the instincts proper, those that pass over into emotions; for they are responses or reactions of the whole organism, and not of some particular organ or member. *Most of the large directive pressures*, that we placed at the upper end of the scale, *show themselves rather in the volume and trend of the mental stream* than in the addition of new processes, though it is quite possible that they imply specific bodily attitudes, and arouse specific patterns of kinæsthesis in head or eyes, from breathing or from the muscular set of the trunk. We all know how it feels to be critically on guard against deception; but is there not, sometimes at any rate, a felt attitude of acceptance, of credulity? could we not, sometimes, after the serious-faced jester has played his trick upon us, *feel* ourselves back into our credulous attitude? We all know, again, how disconcerting it is to be faced by a third possibility when we have comfortably reduced things to a choice of alternatives; but can we not, now and then, catch ourselves in a *felt* attitude of dividing by two? Let the reader keep an eye on his own experiences! Lastly, a response that is often repeated will illustrate the psychological law of growth and decay (p. 183); the organic and kinæsthetic sensations will be supplemented by *images*, which will increase up to a certain point, and thereafter fall away. Fear of the dark is one instance;

the use and disuse of terms of endearment offer another.

As regards **feeling**, we can only say that all six types of sense-feeling — the agreeable and disagreeable, the exciting and subduing, the straining and relaxing — may appear in connection with instinctive responses, and especially with those that we have placed in the middle portion of the scale. Such words as fear, pugnacity, rivalry, carry the stamp of feeling upon them.

§ 48. **Determining Tendencies.** — The reader must have felt for some time past that we sorely need a technical term for all the directive nerve-forces, brain-habits, instinctive tendencies, and so forth, that figure in psychological discussion. There is such a term, formed on the analogy of 'associative tendencies'; psychologists are coming more and more to speak of **determining tendencies.** Any nervous set or disposition that turns our attention in a certain direction, that casts our perceptions into a certain form, that places a definite meaning upon an equivocal word, that governs our response to a particular situation, may be called a determining tendency. Some of these tendencies are simple, and some are extremely complex; some are inherited, and some are acquired in the life-time of the individual. All alike *lay down a path of least resistance for the psychoneural processes* (p. 164) *to follow*, and thus determine the flow of the mental stream.

Why, then, has not the term been introduced before? would not its use have simplified things, have brought the different topics together, have saved a good deal

of roundabout phrasing? No doubt. But *there are two dangers in the use of such a technical term.* The one is that you think merely the words themselves, and do not carry your thought back to the nervous system. A determining tendency is an affair not of mind but of body; and if we had used the words from the outset, you might easily have slipped into the belief that there are determining tendencies in the mind, and might thus have left the nervous system out of account. Have you not — to be honest! — thought and spoken of your 'bodily sensations' ever since you studied the chapter on sensation? Yet there are no physical or bodily sensations, any more than there are mental determining tendencies; the bodily processes correlated with sensation are not the sensation, and the mental flow correlated with a nervous tendency is not that tendency. The second danger is that you look upon the technical term as self-explanatory; so that, just as popular psychology explains the conduct of the lower animals by 'instinct,' without ever asking what instinct is or how it explains, you too explain certain mental phenomena by 'determining tendency,' forgetting that the work of correlation is still all to do. New terms bring these risks, that you put the word in place of the facts and confuse a label with an explanation; but they are also inevitable, when new observations accumulate; and this particular term should now be as harmless as it is necessary.

We shall meet the determining tendencies again, when we come to deal with action and thought. Meantime let us note that they furnish a definition of that rather obscure word 'suggestion.' A **suggestion** is something

that comes to us with more or less of the force of a command; but what does this 'force of a command' mean? Our new technical term helps us: a suggestion is *any stimulus to nervous activity, external or internal, with or without mental accompaniment, that touches off a determining tendency.* The determining tendency may be realised, or may be inhibited, as circumstances decide; the essence of a suggestion is, always and everywhere, that it releases such a tendency. Thus, the psychological observer of whom we spoke on p. 96 received from the experimenter certain instructions; these instructions were obeyed, that is, they were effective suggestions. What, now, set up the determining tendency to follow instructions? A foregone suggestion: the student came into the laboratory to observe, to be taught, to put himself under direction. What brought him into the laboratory? Another foregone suggestion: the wish to learn psychology at first hand, the example of his friends. What led him to choose at the university the course that includes psychology? What led him to choose this particular university? What led him to enter any university? All these results are due to suggestions, which grow in number and complexity the farther back we go; and the force of the suggestions, in every case, is their appeal to determining tendencies. A nervous system that lacked these tendencies would furnish its possessor with connections that were all, so to speak, on the same plane; the organism could neither lead nor follow, neither choose nor reject, neither work nor play; it would not be suggestible.

From this digression we pass to the study of emotion,

which, as we have seen, is closely related to the instincts of the middle part of our scale.

§ 49. **The Nature of Emotion.** — Suppose that you are sitting at your desk, busy in your regular way; and suppose that a street-car passes by the house. The familiar rumble does not distract you; it slips in among the obscure processes of the margin. Suddenly you hear a shrill scream; and now the noise of the car shoots to the focus of attention, becomes the context of the scream. You leap up, as if the scream were a personal signal that you had been expecting; you dash out of doors, as if your presence on the street were imperatively necessary. As you run, you have fragmentary ideas: 'a child,' perhaps, in internal speech; a visual flash of some previous accident; a momentary kinæsthetic set, the stiffening of protest, that represents your whole attitude to the city car-system. But you have, also, a mass of insistent organic sensation: you choke, you draw your breath in gasps, for all the hurry you are in a cold sweat, you have a horrible nausea; and yet, in spite of the intense discomfort that floods you, you have no choice but to go on. In describing the experience later, you would say that you were horrified by hearing a child scream; the mental processes that we have just named make up the **emotion** of horror.

An emotion is thus a *temporal* experience, a course of connected processes; it begins, in our illustration, with the empathic perception of the scream, and lasts through and beyond the events that we have described; indeed, the last traces of the horror may not wear off for days.

It is also, characteristically, a *suddenly aroused* experience; it begins abruptly, though it dies down gradually; the accident comes upon you all at once, and drives everything else out of mind. It is highly *complex*, since its stimulus is not a single object, a perceptive stimulus, but a total situation or predicament, which may arouse all sorts of ideas. It is coloured through and through by *feeling*, since both the situation itself and the organic sensations of the emotive response are definitely pleasant or unpleasant. It is, at any rate in its more intense phases, insistently *organic;* we took the testimony of language on p. 65, and you can easily add to the instances there cited; though it must be said also that the proportion of organic sensations to ideas varies greatly from emotion to emotion and from individual to individual. Finally, it is always a *predetermined* experience, issuing from determining tendencies and moving forward, in the given case, to a natural end; though here, too, there is great variability, since the determining tendencies to which the situation makes appeal may be almost wholly instinctive, or may (as in the illustration we have chosen) be partly instinctive and partly acquired.

The older books on psychology devote a great deal of space to the **classification** of emotions; modern psychology has rather been concerned to bring emotion into the laboratory, and to trace the emotive pattern under experimental control. It was natural to begin with the simpler modes of feeling, and to proceed from them to the more complex; and experiments were therefore made on the sense-feelings. We have seen that the results are not yet definitely assured (pp. 83 f.), so that it

is still too early to write an adequate psychology of the emotions. On the whole, however, it seems that *the three dimensions of sense-feeling will serve for a classification of emotion:* joy and fear are agreeable and disagreeable emotions, anger and grief are exciting and subduing, hope and relief are straining and relaxing. It is not difficult to carry this classification further; to find, for instance, agreeable-exciting, disagreeable-exciting, agreeable-subduing, disagreeable-subduing, even agreeable-exciting-straining, agreeable-subduing-relaxing forms, and so on and so forth; but nothing is gained, at present, by drawing such distinctions. We shall therefore leave the classification thus in the rough. One point only calls for comment. We said that *emotion is a suddenly aroused experience*, beginning abruptly and dying down slowly; yet the straining and relaxing emotions — hope, anxiety, disappointment, relief — seem, on the contrary, to arise slowly and gradually. It is difficult to be sure of the facts; but we must be careful not to confuse the starting of an emotion with what occurs after it has started. It may very likely grow in strength; and it will follow, as we have said, a characteristic course in time, until it reaches its natural end. Either of these things — the growth in intensity or the development in time — may give the illusion of a gradual beginning. If we abstract from them, then it appears that these straining-relaxing emotions really come suddenly; they occupy the mind all at once; we shift directly from grief to hope, from satisfaction to anxiety, from fear to relief; the emotions may alternate in our experience, but they set in abruptly. We say of a sick

friend ' The doctor says that we may begin to hope,' or ' The relatives are beginning to be a little anxious '; but as a matter of psychological fact the hope and the anxiety appear to come and go, as mental patterns, quite suddenly; the situation touches off, actualises, now the one set of tendencies, and now the other. So our general description of emotion may stand.

§ 50. **The James-Lange Theory of Emotion.** — We saw that emotion, at any rate in its intenser phases, is insistently organic; the organic sensations readily blend both with one another and with feeling; and the resultant massive fusion is as characteristic of emotion as the organic surge (p. 211) is characteristic of instinct. Everyone can distinguish, even in imagination, the rushing, swelling ' feel ' of anger from the sinking, shrinking ' feel ' of fear. Psychology has always had an open eye for the organic constituent of emotion; Aristotle and many later writers refer to it; and in France emphasis upon the organic stir in emotion became almost a matter of psychological orthodoxy. The whole subject was, however, set in a new light when the late Professor James propounded in 1884 his famous ' theory of emotion.' " My thesis is," James wrote, " that the bodily changes follow directly the *perception* of the exciting fact, and that our feeling of the same changes as they occur *is* the emotion; " " The more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike or tremble, because we are sorry, angry, or fearful, as the case may be." The view thus paradoxically

stated aroused much discussion; and it gained further impetus by the publication in 1885 of an essay on emotion by Carl Lange, professor of medicine in Copenhagen; Lange independently comes to a conclusion which, in principle, is the same as that of James.

James' position is, evidently, twofold. He affirms, in the first place, that *emotions have an instinctive basis.* A situation is presented; the organism perceives it; and immediately, directly, because the situation appeals to instinctive tendencies in the nervous system, the emotive response is evoked. With that statement we have no quarrel. James also affirms, however, that *the 'feel' of what we have called the emotive response is itself the experience of emotion;* having the organic sensations, you have the emotion; if you had not the organic sensations, there would be no emotion. In a later essay he modified or amplified his position: he grants the presence in emotion of ideas and of pleasant and unpleasant feelings, but still maintains that the one thing characteristic of the emotions is a general seizure of excitement, a churning-up of the interior of the organism; and this rank excitement is a matter of the organic sensations.

So there arise two questions of fact: *is emotion possible if the organic sensations are lacking?* and *is the organic fusion sufficiently differentiated, in the various emotions, to give them their distinctive 'feels' in experience?*

To answer the *first* question we have observations both upon dogs and upon human beings. Emotive responses "occur in dogs in which practically all the main viscera and the great bulk of skeletal muscle have been removed from subjection to, and from influence upon, the brain

by severance of the vagus nerves and the spinal cord. In these animals no alteration whatever was noticed in the occurrence, under appropriate circumstances, of characteristic expressions of voice and features, indicating anger, delight or fear." So far, then, the evidence tells against the necessity of organic sensations. As regards human beings, we cannot, of course, produce a visceral anæsthesia at will, by operating upon the living nervous system; we must wait until cases turn up in the hospitals. Some such cases have been examined; and while the observations made upon them are not conclusive, still, they lend themselves more readily to the same than to the opposite interpretation; if emotion is lacking, the lack seems due rather to a general impairment of nervous function, including that of the brain, than to the specific loss of the organic sensations. The evidence as a whole is thus unfavourable to James.

To answer the *second* question we may refer to the results of experiments recently conducted by Professor W. B. Cannon in the physiological laboratory of Harvard University. "If various strong emotions can thus be expressed in the diffused activities of [a certain division of the nervous system] — the division which accelerates the heart, inhibits the movements of the stomach and intestines, contracts the blood vessels, erects the hairs, liberates sugar, and discharges adrenin — it would appear that the bodily conditions which have been assumed, by some psychologists, to distinguish emotions from one another must be sought for elsewhere than in the viscera. We do not 'feel sorry because we cry,' as James contended, but we cry because, when we are sorry or over-

joyed or violently angry or full of tender affection, — when any one of these diverse emotional states is present, — there are nervous discharges by sympathetic channels to various viscera, including the lachrymal glands. In terror and rage and intense elation, for example, the responses in the viscera seem too uniform to offer a satisfactory means of distinguishing states which, in man at least, are very different in subjective quality. . . . The viscera are relatively unimportant in an emotional complex, especially in contributing differential features." The technicalities of this quotation do not here concern us; you will understand them if you read Dr. Cannon's book; but it is clear that, again, the evidence is against James' view.

We must conclude, then, that *the emotive pattern is a more complicated affair* than the James-Lange theory represented it to be. All the component processes — perception, ideas, kinæsthesis, organic sensations, feeling — play their part in the total experience. We must conclude, too, that *the pattern varies, at least in the matter of emphasis, from one individual to another;* that the processes which ' mean ' anger or fear to *A* may differ from those which ' mean ' the same emotion to *B;* the ideas, the kinæsthetic set, the organic sensations, may be more or less vivid, more or less extended, more or less stable features of the mental pattern. In fine, we agree with James that all emotions have an instinctive basis; and we agree with him, further, that the organic commotion, always present in some measure and degree, is characteristic of the experience; but *we cannot regard this organic commotion either as* **constitutive**, *as the one*

thing necessary to emotion, or as **differential**, *the one thing that marks off any particular emotion from all the rest.* From an æsthetic point of view we may regret this conclusion; it is always more satisfactory to end up a discussion with some positive, clean-cut statement than to leave the subject with a ' safe ' generalisation and a balanced judgement; but when we are seeking scientific truth, we may not outrun the facts we have; and when a science is in the making, the facts will not often round off prettily into a comprehensive theory.

§ 51. **The Expression of Emotion.** — If the classification of emotions is a pleasant exercise for authors of a logical turn, the outward show of emotion in **gesture** and **facial expression** has always been attractive to those who pondered the relations of mind and body. It may even be true that observation of these expressive movements lies at the very root of psychology; for in emotion a man is changed, transformed; he is unlike himself, out of himself, beside himself; and what could suggest, more plainly than such transformation, the activity of an indwelling mind? However that may be, there is a long list, stretching down the centuries, of works that deal with emotive expression. We must ourselves pass over everything that appeared before the time of Charles Darwin.

Darwin, who was naturally anxious to bring the facts of expression under his formula of evolution, began to collect data as early as 1838; and with characteristic thoroughness he went to all available sources, — to animals, to the human infant, to the insane, to works

of art, to the play of the facial muscles under the electric current, to the different races of mankind. In his book of 1872 he distinguishes three main principles of expression; the titles will be understood from the examples. The first principle is that of *serviceable associated habits*. We all jump when we are startled, and wince when we are threatened; and the jump and wince of man are weakened survivals of the frightened animal's leap out of danger, and of its cowering self-effacement in presence of a stronger enemy. The face of scorn, " curving a contumelious lip," lays bare the canine teeth, as if for actual attack; the sneer of man is but a weakened survival of the snarl by which our stronger-jawed ancestors unfleshed their teeth for the combat. The second principle is that of *antithesis*. If indignation shows itself (according to the first principle) by squared shoulders and outthrown chest, the opposite of this aggressive indignation, humiliation or self-abasement, shows itself in the opposed attitude of raised shoulders and indrawn chest, Shylock's " patient shrug." The third principle, lastly, is that of the *direct action of the nervous system*. Thus we all tremble from fear; and " trembling is of no service, often of much disservice, and cannot have been at first acquired through the will, and then rendered habitual in association with any emotion "; it must be directly due to the constitution of the nervous system.

Darwin's principles have been much criticised; in particular, the purely negative principle of antithesis has received short shrift from later writers. One of the things that he fails to account for is the imitative play of the lips. The disgusted man looks as if he were about

to retch; the injured man looks bitter; the disappointed, sour; the satisfied, sweet; the mouth, in these latter cases, is set as it is when we have a bitter, sour, or sweet taste. What is the reason? We may remind ourselves that primitive language was concrete, and not abstract; that it abounded in what we should nowadays call metaphor. We may remember also that the one thing necessary in a primitive society is food, and that primitive metaphors would naturally be, to a large extent, metaphors drawn from the preparing and obtaining of food, from cooking and hunting. So we may imagine that the successful hunter, returning to camp, licked his lips, seemed already to be sucking the sweet morsel; while the unsuccessful drew his lips out sideways, as if he were trying to taste as little as possible of his sour draught. In course of time the metaphor will lapse; or, more strictly, the old concrete way of speech will give place to an abstract phrasing, and will hold its own only *as* metaphor, as a bit of picturesque imagery; we still talk to-day of the sweets of love and revenge, of tasting success, of tainted money, of a soured disposition, of the bitter end. Meanwhile the original gesture, if only it is fitted for communication, will persist unchanged; gesture is far more conservative than language; and the look of a bitter taste will thus express the emotion of a man who is suffering, perhaps, under an unjust accusation.

We may say of all such attempts at explanation what we said of the biological theory of feeling: it would be foolish to reject them outright, and yet *they are too general, too open to criticism, to satisfy the requirements of science.* We need detailed work, both upon

the physiological and upon the psychological side. Consider, for example, the erection of the hair in fear and rage. This is a result of the diffused activity of the 'sympathetic' nervous system, the total effect of which is to *energise* the organism; when two boys are wrestling, the friends of the weaker or less skilful shout to him to 'get angry'; and terrified men achieve wonderful feats of leaping and running. But how precisely does the contraction of the muscles beneath the skin subserve this energising? Is it an accident, so to speak, due merely to the diffusion of the nervous activity? or has it a special physiological function? and has it, further, anything of the biological significance that Darwin attached to it? Until such questions are answered in detail, we cannot formulate general principles of the expression of emotion.

§ 52. **Mood, Passion, Temperament.** — The weaker emotive states, which persist for some time together, are called *moods;* the stronger, which exhaust the organism in a comparatively short time, are called *passions*. No sharp line of distinction, however, can be drawn, either as regards intensity or as regards duration, between these various experiences.

We have special names for the **moods** which correspond with most of the emotions; thus, cheerfulness is the mood of joy, and depression the mood of grief. As a rule, the mood appears suddenly, rises slowly to a relative maximum, and then slowly dies down. You wake in the morning, feeling irritable; you proceed to take everything irritably, and so become more irritable still; and after a while the incidents that prompt to

irritability seem to grow rarer, and the mood gradually disappears. There are times, however, when some intercurrent event brings about a quick and total change of mood; and there are times when the mood passes off abruptly, without assignable reason; you are surprised to find yourself suddenly cheerful. It is a commonplace that mood depends, in large measure, upon bodily health; but the correlation has not been worked out.

Language also has many words for the **passions**: fury is the passion of anger, terror the passion of fear. These states imply a severe shock to the nervous system; and though their first effect is to energise the organism, they must soon exhaust its reserve powers; we notice, in fact, that very violent emotions are likely to give way to lassitude or even to unconsciousness. The name of passion is further given, in ordinary speech, to any abiding interest, natural (p. 207) or acquired, — to any mode of emotive response that is specific and lasting. We say that a man has a passion for success, for science, for gambling; and we mean that a situation which shows any sort of reference to these things will appeal to him, dominatingly and one-sidedly, through that reference.

The word 'temperament' comes to us from popular psychology, which classifies mental phenomena under the headings of intellect, feeling and will, and places individual endowment under the corresponding headings of talent, temperament and character. **Temperament**, so far as the term can be employed in a strictly psychological sense, is thus *a very general term for the innate susceptibility of the individual to emotive situations and for the typical character of his emotive responses.* The

doctrine of temperaments was first systematised by the Greek physician Galen in the second century of our era, though the germs of the current fourfold classification — into choleric, melancholic, sanguine, phlegmatic — go back much further in the history of thought. This classification takes account of *the strength and the duration* of the emotive response: the choleric person responds quickly and strongly, the melancholic slowly and strongly, the sanguine quickly and weakly, the phlegmatic slowly and weakly, to the situation which evokes emotion. Crude to the last degree! we say: and yet it is astonishing to see what a master can do with such crudity. Thackeray, in *The Newcomes*, has drawn almost pure types of temperament; Madame de Florac is melancholic, Fred Bayham is choleric, Mrs. Hobson Newcome is sanguine, and Rosey is phlegmatic; and the minor characters in a great many of our best novels tend in the same way to personify the four temperaments.

But has not psychology advanced beyond this fourfold classification? Not appreciably. There are books, written by psychologists, on temperament and character; but the resulting classifications, though more elaborate and more ingenious, are also individually coloured; nothing like finality has been reached. *A good deal might be done, in this field, by the roughest kind of observation, provided it were long enough continued.* If you kept a diary for a couple of years, putting down the nature and occasion of your emotions, and the nature and duration and occasion and course of your moods, you would be gathering material which psychology still lacks, and which might serve as starting-point for detailed analytical study.

Questions and Exercises

(1) In the passage which heads this chapter, Descartes expresses the opinion that joy, sorrow, love and hate are the primary emotions. Do you agree with him? Why? How would you set to work to discover the primary emotions?

(2) Do you think that there is an instinct of imitation? Give reasons for your answer; then consult the books.

(3) Write a paragraph, as if for insertion in this chapter, on the psychology of surprise.

(4) Give instances of emotive expression, from your own observation, that seem to illustrate Darwin's three principles.

(5) Define, without looking at the book, instinct, emotion, determining tendency, suggestion.

(6) The figure below shows the facial expression of two opposite emotions, as suggested by the natural philosopher and artist Leonardo da Vinci (1452–1519; see A Treatise on Painting, 1877, 65). What are the emotions? Can you offer any explanation of their expressions?

(7) Suppose that an actor is to play an emotional part on the stage. Will he do better if he himself feels the part, or if he remains cold and merely simulates the expression of emotion?

(8) Can you give instances, from your own experience, of the modification or suppression of movements which naturally express emotion? Does this inhibition of movement affect the emotion itself? Do not generalise hastily; gather a number of cases.

(9) Recall some specific emotion that you have experienced. What processes are imaginal or 'reproduced,' and what are set up anew or 'produced,' in the recall? Write fully and carefully.

(10) You have already been asked to discuss the possibility of 'mixed feelings' (p. 88). Are there 'mixed' or 'mingled emotions'? If so, in what sense?

(11) It is said in the text that no sharp line of division can be drawn between emotion, passion and mood. Illustrate this statement from your own experience.

(12) Give instances, from poetry or fiction, of the delineation of practically pure temperaments.

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CHAPTER IX

Action

The ordinary way of speaking is, that the Understanding and Will are two faculties of the mind; yet I suspect that this way of speaking of faculties has misled many into a confused notion of so many distinct agents in us, which had their several provinces and authorities, and did command, obey, and perform several actions, as so many distinct beings: which has been no small occasion of wrangling, obscurity and uncertainty in questions relating to them. — John Locke

§ 53. **The Psychology of Action.** — There seems to be a great gulf fixed between plants and animals, and you were probably surprised to read, on p. 13, that there are not a few psychologists who take the question of a plant-mind with scientific seriousness. If you ask yourself, now, wherein this gulf consists, you will find that it reduces in the main to a single point of difference: *the higher plants are stationary organisms, the higher animals are motor.* The plant stands still and has to wait for things to come to it; and its organisation fits the case; it spreads its organs over the widest possible space, and is all, so to say, on the outside. The animal moves; it goes to things; and its organisation is correspondingly different; the vital organs are packed away inside, where they are out of harm's reach, and are distributed in such a way as to be easily carried. It would be strange, then, if movement — the great differential character of the animals — did not somehow

fall within the range of psychology; and we know that it does; for we are continually hoping, fearing, resolving, refusing, wishing to *do* something, or feeling glad, sorry, satisfied, disappointed, resentful that the something has been *done*. Moreover, we have already made frequent reference to movement; we have spoken of the attitude of attention, of movement of the eyes, of instinctive and expressive movements; and we have also laid stress upon the manifold part played in the mental life by kinæsthesis, by sensations from the moving organs. So we are prepared to consider movement in its own psychological right, as correlated with special mental processes or patterns.

There are, as usual, a few preliminary matters to be got out of the way. First of all, we shall do well to distinguish the terms 'movement' and 'action.' Movement is, without question, the wider term. Action, although it is very loosely used in ordinary speech, so that we speak of the action of a horse or a sewing-machine, is the word that we naturally employ in referring to human conduct. We may therefore take advantage of this difference in meaning, and may say that **action**, as a technical term in psychology, denotes *any organic movement that has mental correlates;* or more strictly, that it is an organic movement any phase of which, beginning, middle or end, has mental correlates. The need of the stricter definition will appear as we go on.

Secondly, we must be clear as regards the **problem** which action, as thus defined, presents to psychology. We have, of course, *to describe and to correlate;* to describe the mental processes that occur with movement,

or with one or more of its phases; and to indicate, as well as our knowledge permits, the corresponding processes in the nervous system. We have made out three modes of correlation: separate mental processes correspond with certain brain-processes; the pattern of mental connection corresponds with the play of associative tendencies in the brain; and the course of the mental stream corresponds with the activity of determining tendencies. These, then, are the limits within which we work; and we shall be obliged to leave the subject very much in the rough; for psychological description is still imperfect, and our knowledge of the nervous mechanisms is woefully incomplete. Be clear, nevertheless, that *the psychological problem lies within these limits.* The psychologist has nothing to do with the relative values of 'motives.' He cannot teach you how to acquire 'control' of your actions. His task is simply to set forth the facts; and if the facts that he discovers are of value for morals or education, as indeed they can hardly fail to be, so much the better; only, you must not confuse scientific information with practical advice, and be disappointed at the one because you do not receive the other. All this has been said before; but the present is a good time for repeating it.

Lastly, you should realise that in an organism so complicated as man, and of such varied and eventful history, *movement by itself is no index to mental process.* There are, no doubt, outward and visible signs of hesitation, of deliberation, of quick resolve; but the bare movement is not a cue to mind. Psychological enquiry must always go *behind* the movement; that is, we must

either know the previous mental history of the individual who makes the movement, or we must ourselves arrange the circumstances under which the movement is to be made. Suppose, for instance, that you have to sign your name to a deed. You may have spent weeks in reflection, in balancing pros and cons, in painful indecision; your action is then a 'voluntary action' of the most positive sort; and yet, when the moment comes, your signature flows smoothly from the pen, as if the matter had never cost you a moment's worry. Now suppose that you are sitting in a committee-meeting, listening to a tedious report; you take the blank paper before you, and write your accustomed signature, without either the intention to write or knowledge that you are writing. The two movements may be indistinguishable, and yet this second writing is an 'automatic' or 'involuntary' action. So a hand-shake may mean the barest recognition of a casual acquaintance, or the friendly settlement of a long-standing disagreement; the onlooker can see no difference in the movements, though their mental accompaniments are worlds apart. There is, indeed, no chapter in psychology that illustrates *the law of mental growth and decay* (p. 183) so fully and so surprisingly as this chapter on action. Movements that once were rich in mental correlates fall into the direst psychological poverty; and movements that now are poor may acquire a mental fortune, which they in their turn are bound presently to lose.

§ 54. **The Typical Action.** — Under these circumstances, it sounds a little incongruous to talk of a 'typi-

cal' action. But we must start somewhere; and we may, perhaps, say that the typical action, for psychology, is *an action of the simplest form taken at its psychological best;* in other words, an organic movement that is *singly* determined and that shows a *maximum* of mental accompaniment. You will understand better what this definition means when we have worked out an illustration. Meantime, you can see that such an action — we call it an **impulsive** action — serves as point of departure in two directions. The form may remain simple, while the mental side suffers reduction; or the form may become complicated, and therewith new mental characters may be introduced. In the former case, the impulsive action runs downhill toward automatic; in the latter, it climbs up toward deliberative action.

Now for the illustration! Suppose that, as I am writing this paragraph, it occurs to me to look up a reference, for quotation, in a particular book that stands on the shelf by my side. I turn toward the shelf, recognise the book, take it in my hand and turn the pages, and presently find the passage I had in mind to use. I have performed *an impulsive action*, in the sense of our definition; the illustration is complete. I shall go on to put a marker in the book, or to copy out the sentence, and ultimately I shall return the book to the shelf; but these later developments do not here concern us.

Let us try to analyse this action; and since the mental accompaniment is fairly complex, let us analyse, at first, only in large and gross terms. We begin with a preparatory phase, in which there are two things to notice: the *intention to move* (it occurs to me to look up the

reference) and the *idea of the result* of movement (finding the required passage for quotation). Then follows a middle phase, in which the outstanding thing is the *perception of the object* of movement (I see and identify the book on the shelf). The final phase includes a *perception of movement* itself in kinæsthetic terms (I reach out, take the book down, turn the pages) and also the *perception of the result* of movement (I find the sentence). So we have three roughly distinguishable phases, each one issuing from that which preceded it, which we may formulate as follows:

Intention of movement / Idea of result → Perception of object → Perception of movement / Perception of result.

You understand that the arrows indicate a definite direction; the second and third phases issue from the first; *the whole course is predetermined.* When I perceive the book, under this impulsive determination, the associative tendencies have no freedom of play; I cannot think that the back is breaking, or that I know the writer, or that the chalky paper is detestable, though all of these are things that might occur to me at another time; I can only recognise the book as the book that will realise my idea of result, that contains the passage I need. The whole course, again, is singly, *unequivocally,* predetermined; it occurs to me to use the quotation, and I do not reflect or hesitate; I act directly and forthright upon the suggestion; there is no conflict. In a word, the example shows us action in its simplest form and with a maximum of mental concomitant; and that is what we agreed to regard, from the psychological point of view, as a typical action.

Analysis of this crude kind does no more than give us our bearings. If we are to lay out the facts with scientific accuracy, we must carry actions into the laboratory, and examine them under experimental conditions. We do this by way of the ' reaction experiment.'

§ 55. **The Reaction Experiment.** — The reaction experiment comes to us, of all unlikely things, by the road of astronomy. In the old days, before electrical instruments were invented, astronomers used to time the passage of a star across the meridian of their observatory by means of the *eye-and-ear method*. You can easily imagine the procedure. You have your eye at the ocular of a telescope, the field of which is evenly divided by a number of fine vertical lines. The star enters the field from the right, and crosses to the left; your task is to determine the instant at which it traverses the midmost vertical line, which corresponds with the meridian. A clock is behind you, beating seconds; and you count these seconds, one, two, three, from a given starting-point. If the star passes the meridian exactly on a beat, well and good; you know the time of its passage; if, as ordinarily happens, it passes somewhere between two beats, then you must estimate the time of passage to the nearest tenth of a second. That is the principle of the eye-and-ear method; you watch and listen, and so make your observation.

In the year 1796, the astronomer in charge of the Greenwich Observatory found himself obliged to dismiss an otherwise competent assistant, who in the previous year had fallen into the habit of recording his transits some

half-second too late, and had now increased his error to almost a whole second. This unfortunate man was the originator of what came to be known as the **personal difference**. For it was found that no two astronomers exactly agreed in their recording of times; every observer differed from every other by a certain average amount. So it became customary to take some highly skilled observer as standard, and to refer other observers to him; and that is the origin of the **personal equation**; the formula $A - B = 0.8$ sec. means, for instance, that the observer A records a transit, on the average, four-fifths of a second later than the more skilled observer B. What B's error may have been nobody knows.

We cannot trace the history of the personal difference in detail. It is enough to say that the astronomers, having discovered it, were naturally anxious to get rid of it; and they presently found a way to relieve the observer of the task of listening; he simply pressed a key when the star crossed the line of the meridian, and the time of pressing was recorded automatically. This device did not eliminate the personal difference; but it was methodically of great importance. For the eye-and-ear method had now become, essentially, *a method of response to stimulus by movement;* and in that form it settled down permanently in the psychological laboratory. The stimulus for the astronomer was the star on the meridian, and the response was the pressure of his finger on a key. But it is clear that the stimulus need not be visual; the observer might just as well respond to a sound or a touch or a taste. It is clear, further, that the response need not be a movement of the hand; the observer

may respond, just as well, by movement of the organs of speech, or of the foot, or of lip or eyelid. It is clear, finally, that if we know the actual time at which the stimulus is presented, and the actual time at which the movement of response takes place, we can measure the interval between the two. A little ingenuity makes this possible. If, for instance, the flash of light which serves as stimulus *makes* an electrical circuit, and the finger-movement in response *breaks* the circuit; and if an electrical clock is placed in the same circuit; then the clock-hands will begin to move when the flash comes, and will stop when the movement occurs, and we can read off the **reaction time** from the dial.

In its simplest form, then, the reaction experiment takes shape as follows. We subject the observer to some prearranged form of stimulation (a flash of light, a sharp noise), to which he is to reply by some prearranged movement (perhaps, the slipping of his finger from the button of a telegraph key); and the instruments which we employ are so connected that we can measure the time elapsing between the exhibition of stimulus and the performance of answering movement. The experiment thus has two sides. It gives us *numerical results, the reaction times* measured in units of our clock, in hundredths or thousandths of a second; but it gives us also a *complete impulsive action*, which we can observe as often as is necessary for analysis.

For consider the course of the reaction experiment in the light of our typical formula of action! The observer sits down with the *intention of moving* when he has perceived the stimulus; and he has an *idea of the*

result of his movement, namely, the performance of a reaction experiment. The stimulus is presented; he *perceives the object* of movement; and slips his finger from the key. He thus *perceives the movement* itself, and also, by the movement, *realises in perception his idea of result.* He has performed a complete impulsive action, but an action which, on the mental side, has been thinned out to a manageable degree of simplicity. The mental accompaniment is there; but the intention to move bears upon a single finger, the idea of result is just the idea of completing the experiment, the perception of object is the perception of a simple stimulus, the movement itself is a slight local displacement of a single member; nothing is left out, although the action is reduced to a skeleton. It has thus been made manageable; the mental accompaniments of the movement are not so complex that they baffle observation; and the technique of the experiment is an outline which can be filled in and further complicated in all manner of ways. We may hope that that Greenwich assistant found further employment; but we can hardly, as psychologists, regret that he timed his transits later than he should!

§ 56. **Sensory and Motor Reaction.** — Suppose that you are performing the simple reaction experiment, and that you tell your observers beforehand to react as soon as they perceive the stimulus. You soon find that this instruction is differently interpreted. One observer will prepare to react as soon as *he perceives the stimulus;* and another, *to react as soon as* he perceives the stimulus.

The difference of emphasis may be brought out by a homely illustration. When the lights are turned on in the evening, it is not uncommon, even in the best regulated families, for a clothes-moth to start up from some corner. You say ' There's a *moth!* ' and clap your hands to kill it. But it escapes; and henceforth you do not trouble to identify it; you clap your hands at anything mothlike that flits across the field of vision; you are set or disposed for the movement. So in the two forms of the simple reaction: some observers tend naturally to make sure of the stimulus, before they move, and others tend naturally to move, as soon as any stimulus has appeared.

We cannot rely, however, upon the natural tendency of the observer, because his attitude is likely to change as the experiment proceeds, and a change of attitude means a disturbance of the experimental conditions. Moreover, there are observers of intermediate tendency, who accent *both* the ' perception of stimulus ' *and* the ' reaction as soon as,' and may accent them in different degree. Hence it is necessary to instruct the observers at the outset that they are to perform either a **sensory** or a **motor** reaction, that is, that they are to look forward either to the perception of the stimulus or to the execution of the movement. With this preliminary instruction, the sensory reaction takes, on the average and for practised reactors, a tenth of a second longer than the motor, whether the stimulus be a sight, a sound, or a touch. The longer time points, of course, to a more complicated nervous path; and that in turn raises the presumption of a richer mental accompani-

ment. Observations show, in fact, that *only the sensory reaction represents a complete impulsive action;* the motor reaction does not fall under our formula.

The main difference — and we have no space for detailed analysis — is this. The instruction for the **motor** reaction sets up kinæsthetic sensations of strain in the reacting member, principally in the finger; these are contextual processes (p. 118), which carry the meaning 'You are to react as quickly as possible'; and they are accordingly known as 'sensations of intended movement.' They imply that the instruction is already in part fulfilled; the muscles are, from the very first, prepared for the movement that shall end the experiment. Indeed, an observer who is thus instructed will sometimes react prematurely, before the stimulus has appeared, and is also liable to accept as *the* stimulus any chance stimulus that intervenes, and so to react wrongly. The instruction for the **sensory** reaction, on the other hand, sets up an expectation of the stimulus; the organism is thus prepared especially for perception; premature and wrong reactions do not occur. The intention to move is present, to be sure, but it is in the background, carried only by the feel of the finger as it lies upon the key, or in more diffuse form by the feel of the extended arm upon the table. We might therefore say that, in the motor reaction, the formula tends to close up on itself, like a telescope; idea of result is always approaching perception of result, and intention of movement is always approaching perception of movement; the perception of object gets squeezed between the two extremes, as these draw together; whereas, in

the sensory reaction, the formula is followed *in extenso;* the mental processes are thinned out, as we have put it, but they are all present, following one another in their regular order. The reaction experiment thus renders the impulsive action manageable, puts it at our disposal for scientific analysis, but also shows that *an action, even in its simplest form, will vary with every shift of emphasis in the suggestion* (p. 213) *which calls it forth.*

Let us look, now, at the **reaction times**, and see if they can be turned to scientific account. So many experiments have been made that we know the average times of reaction, both sensory and motor, to light, sound and touch; and we also know what their average constancy or regularity will be, if the reactor keeps his attitude to the experiments unchanged. The times themselves, and the numerical statement of their constancy, may therefore be used as indexes to the type of reaction, sensory or motor, and to the stability or instability of the reactor's attitude. *They embody, as if in shorthand, the results of oft-repeated observation,* and they may henceforth take the place of direct psychological observation when we are asked to decide on the type of reaction or the reliability of the reactor. The psychological observation must, however, come first; we cannot take the reaction-times of children or South Sea Islanders, and at once put them down as sensory or motor or mixed; we must know what the reactors were trying to do, how they understood the instructions given them.

§ 57. **The Degeneration of Action: From Impulsive to Reflex.** — We have now to trace the course of im-

pulsive action, downward to automatic, and upward to deliberative action. If we start out on the downward path, we note that impulsive action by frequent repetition degenerates, first, to what is called **sensorimotor** or **ideomotor action**: sensorimotor, if the object is still *perceived*, as it is in the impulsive action proper (p. 235), and ideomotor, if the perception is replaced by an *idea* of object. Here the predetermination is a nervous set without any mental correlates; the intention to move has dropped away; and the idea of result is, so to say, incorporated in the perception or idea of object; so that movement follows at once upon this perception or idea. When we sit down at table, for instance, we take up our knife *as* a thing to cut food with; and when we are dressing, we close our fingers round a button *as* a thing to fasten a garment with; the movements that we make are predetermined, but not premeditated; the actions are sensorimotor. When, again, it occurs to us, in the midst of our reading, that the mail must have arrived, we ideate the packet of letters *as* something to be fetched from the mail-box; and when, as we watch the shower, it occurs to us that the cellar hatchway is open, we ideate the hatchway *as* something to be closed; we act without further thought, and the actions are ideomotor.

But the degeneration may go further still. "There is a story," writes Huxley, "which is credible enough, though it may not be true, of a practical joker, who, seeing a discharged veteran carrying home his dinner, suddenly called out 'Attention!' whereupon the man instantly brought his hands down, and lost his mutton

and potatoes in the gutter." Huxley calls this an **artificial reflex** action; and indeed the organism responds, in such cases of thorough drill, as fatally and automatically as in the physiological reflexes, and with as little apprehension of the nature of the stimulus; there is nothing to choose, psychologically, between this direct response to the word 'Attention!' and the blinking of the eye in response to a threatened blow, or the snatching back of the hand from a hot surface, or the withdrawal of the foot when the sole is tickled. From the psychological point of view, impulsive action, instinctive action and artificial reflex all shade off into one another; and the artificial and physiological reflexes are indistinguishable.

Only, as we know, *the artificial reflex has a mental history;* the word 'Attention!' had been called out many thousand times before it became a compelling suggestion. What, then, of the **physiological reflex**? Has it, too, a mental history, extending beyond the individual to the race; is it a racially degenerate impulsive action? or does it belong to a class apart, purely physiological in character, and without right to mention in a text-book of psychology?

The answer to these questions must be speculative; and speculation, as is almost always the case, has swung between opposed extremes. Some psychologists teach that all action has its origin in the physiological reflex; the organism at first moved reflexly, automatically, fatally; and then, later, mental processes were somehow 'imported' into its activities. Others hold that all organic movements were originally of the impulsive

sort; the physiological reflex, so far from being primary, is a late development, the final term in a series which begins with movement of a large, diffuse sort, accompanied by mental processes, and which ends with precise, local movement devoid of mental correlates. Both these views are open to objection from the biological side; and it seems reasonable to suppose that *the earliest movements of the earliest organisms were of two kinds:* some were bare reflexes, or — to use the newer word — physiological 'tropisms'; others, however scanty and undifferentiated their mental accompaniment, were still of the nature of impulsive actions. If this mediating view be adopted, as a working hypothesis, the zoologist and the comparative psychologist must join forces, to trace the racial history of the physiological reflexes, and to determine what part of our human equipment is ultimately tropistic, and what part may be referred back to earlier impulses.

The passage from an impulsive action to an artificial reflex may be regarded, broadly, as an example of the effect of practice. We have seen that improvement in such activity as piano-playing depends, not solely upon repetition, but largely also upon changes in our method of working; upon the sudden discovery of some new trick of procedure, or the sudden release from some hampering peculiarity of method (p. 170). Turning-points of this same sort are characteristic of the path from impulse to reflex; we do not find a gradual refining of movement and a corresponding simplification of its mental accompaniments; the history is rather a matter of short-cuts and substitutions; the organic machine is

too complicated, too sensitive, has too great a variety of resources, to follow a beaten track. So the course of impulsive action, though it be downhill, cannot be expected to run smooth.

§ 58. **The Development of Action: From Impulsive to Selective and Volitional.** — Action appears in its simplest form when it is singly or unequivocally determined (p. 235); and this implies that actions of more complicated form are multiply or equivocally determined. What that means you will see at once if you recall the development of attention. Primary passes into secondary attention because we have many sense-organs, all of them open to manifold stimulation at the same time, and because we have many different lines of interest, several of which may be appealed to by the situation in which we chance to find ourselves; there are rival claimants for the centre of the field of attention. *Impulsive passes into* **selective** *action, in precisely the same way, when the nervous system is the seat of a conflict of impulsive tendencies.*

The passage, however, is not made at one step; the conflict of impulses may remain a mere conflict of impulses, without rising to the pitch of selective action. We have already had an instance: the young child, face to face with a strange dog, behaves as if pulled back and forth by strings; it goes toward the dog, runs back to its father, approaches the dog again, shrinks back again, and so on. It has happened to the author, in presence of the two impulses to shut a door on the right and to seat himself at a desk on the left, to begin the

right-hand movement towards the door, and then all at once to slue around to the desk without having closed it. In such cases, the organism acts impulsively or instinctively, but acts nevertheless under a dual determination; the instincts or impulses are in conflict. Buridan's ass, starving to death between its two bundles of hay, illustrates the logical outcome of an exact equality of the conflicting tendencies.

One may observe this sort of action, typically shown, in the behaviour of those who are asked to guess a riddle or solve a mechanical puzzle. Some people, of course, set to work deliberately, and think the matter out in all its bearings; they are not here in question. A great many will behave in the manner just described; they will hazard guess after guess in quick succession, and they will snatch at one possibility of solution after another, risking everything upon the impulse that happens to be dominant at the moment, until they either light upon the right principle or ' give up.' Professor Lloyd Morgan, one of the best-known writers upon comparative psychology, thinks that this *method of ' trial and error '* is characteristic of animal intelligence. The dog, for instance, placed in novel circumstances, meets the situation at once by some action that derives from his individual experience or from racial inheritance; if that first response fails, he ' tries ' another action, similarly derived; and so on, until luck favours him or he is diverted to something else. Only man advances beyond the stage of ' trial and error ' to the level of rational selection; and man himself need not; in the story of *Dite Deuchars* Sir J. M. Barrie draws an accurate picture of

human conduct permanently arrested between impulsive and selective action.

Selective action appears when the rival impulses are so evenly matched that no one of them can find direct issue in movement; it implies the state of secondary attention; and it is possible only to organisms that possess free ideas of memory and imagination, — probably, that is, only to man. Any biography that goes at all minutely into details will furnish examples. Thus, when the first Napoleon was at liberty to turn his thoughts to England, after the treaty of Schönbrunn (1809), he found two possibilities of action: he might himself take in hand the conduct of the war in Spain, or he might devote himself to heightening the rigour of the blockade in the north and north-west. He 'chose' the latter course; that is to say, he passed through a period of doubt and hesitation, weighing the alternatives and estimating results, — we know the pattern of secondary attention, — until presently the stronger impulse won. *It is always the strongest impulse that wins;* though here, as also in the case of attention, it is not necessarily the impulse that looks the strongest to psychological observation; there may be a more impressive array of ideas on the side that finally gives way. The winning impulse, as we see in historical examples of selective action, is that which has the strongest backing of nerve-forces (p. 96). The actor, oftentimes, cannot make his action plausible, even to himself, when he tries to state his 'reasons'; but the sympathetic historian can trace the influence of tendencies which had no mental correlates, and whose existence was therefore unsuspected by their possessor.

All this is clear in principle, though psychology stands sorely in need of detailed analyses. Let us add a final word of caution, — that you beware of confusing the practical or moral value of selective action with its psychological status. Napoleon the Great was an incomparably more efficient person than Dite Deuchars, and the results of his action were incomparably wider; but with a trifle more balance in the impulsive tendencies, and a little freer play of ideas, the latter gentleman could have performed selective actions of the same psychological type as Napoleon's.

There is, however, another kind of action — we may call it **volitional** action — in which *an impulse seems to come into conflict, not with another impulse, but with some idea or group of ideas that has no motor reference.* I hear my alarum-clock, and have the impulse to get up; but that impulse is definitely opposed by the idea of another half-hour's sleep. How can an idea oppose an impulse? When Cæsar crossed the Rubicon his alternative was not another course of action, but the passive resignation of the two Gauls and the disbanding of his army; the choice lay between acting and refraining from action. How can activity and passivity thus come into conflict?

The answer to these questions is given with what we said about the nervous correlates of attention (p. 109). We learned, you remember, that *nervous reinforcement and nervous inhibition go hand in hand:* neither acts without the other; but we were not able at that time to present the evidence for this belief. The evidence is twofold. We find, in experiments upon *abstraction,*

that reinforcement always implies inhibition. Suppose, for instance, that the observer is shown a series of coloured figures, each one for a fraction of a second only, and that he is asked to report accurately upon the form of these visual stimuli. He can do so: but if he is then asked to report further about the colour, he can say little if anything in reply. Reinforcement of the form has brought with it inhibition of the colour. We find, again, in experiments with what is called *negative instruction* that inhibition always implies reinforcement. Suppose that a picture is shown, and that the observer is told to utter the first word that occurs to him when he sees it, only that the word uttered is *not* to be the name of the object pictured. He can do this, too; but the results prove that the 'negative' always brings in a 'positive'; either the throat is held stiff, locked up for the time against any utterance whatever, or the instruction 'Don't name the object' is translated by the observer into 'Name a property of the object' or 'Name a use to which the object might be put'; inhibition of the name has meant reinforcement of throat-kinæsthesis or of some positively suggestive idea.

Apply this evidence, now, to the case in point! The sound of the alarum-clock is, on the face of it, a positive suggestion, bidding me get up; but every suggestion is really two-faced; if it sets off certain of the tendencies natural to the situation, it also checks others. The sound of the bell, therefore, not only reinforces the getting-up tendencies, but also represses the nervous disposition that tends to keep me lying still. In the same way, the idea of further sleep means not only the rein-

forcement of this disposition to lie still, but also, on the negative side, a blocking of the suggestion from the alarum-clock. The situation offers the alternatives 'action' and 'no action'; but the nerve-forces which the situation calls into play, and which correspond with these alternatives, both alike bear upon 'action,' as both alike bear upon 'no action.' *The conflict is thus, after all, of the same kind as in selective action.* Idea does not oppose impulse, nor does activity oppose passivity; but nerve-forces which make for action and against rest oppose nerve-forces which make for rest and against action; the double-faced nature of the nervous mechanism is the key to the riddle. The particular 'action' and the particular mode of 'no action' are, naturally, determined by the situation itself.

If these selective and volitional actions are often repeated, choice is likely to give way to habit; some one impulse gains predominance over the rest; and then, as if to pay the price of victory, speedily falls to the sensorimotor or ideomotor form, and finally lapses into an artificial reflex. When we are learning to play a musical instrument, our actions are one and all selective; we have to think which dot upon the staff stands for which note upon the keys, and which finger is to be set down where. When we have become adepts, the bare sight of the printed score touches off the appropriate movements; we play 'instinctively' in the right key, in the right tempo, with the right emphasis; we may even carry on a conversation, and still play correctly, though we have never seen the score before. The practised speaker does not 'choose' his words; his ideas express them-

selves for him; he may even run ahead in thought, while his larynx is still busy with the present topic. The road to automatism is that with which we are already familiar (p. 245), though the psychological history of the automatic actions is different.

§ 59. **The Compound Reaction.** — The detailed analyses that we felt the need of on p. 249 ought, by rights, to be provided by the reaction experiment; for that, as we said on p. 239, furnishes an outline-plan of experimental work which can be filled in and complicated in all manner of ways. Why, then, should not selective and volitional action be as manageable as impulsive? and why should we not follow, experimentally, the rise of impulse to choice and its later return to impulse?

There are two main reasons, the one internal and the other external, why the reaction experiment has not developed along the lines of our psychological classification of action. The internal reason is that *the reactor is extremely sensitive to slight changes in instruction,* in the rules laid down for the experiment. We have already had an instance: the sensory reaction is a skeleton impulsive action; but the motor reaction, which results from a shift of emphasis in the instruction, is not sensorimotor; it is an abbreviated or telescoped impulsive action. Psychologists have naturally been interested in this side of the experiment, and so have tried the effect of varying instructions, instead of duplicating in the laboratory the gross types of action that our classification distinguishes. The second, external reason is that *the reaction, largely on account of its outside origin,*

was for some time treated in a chapter apart; not until the nineties of the last century did psychologists realise that it gave them experimental control of action; and so the technique has been complicated and the outline filled in without special reference to the psychology of action. We need not here go into details; it is enough to say that experimenters have tried the effect of increasing the number of stimuli, and thus of leaving the reactor more or less uncertain of what he shall expect; of increasing the number of possible responsive movements; and of varying the instruction given beforehand to the reactor, in such wise that a particular responsive movement is assigned to a particular stimulus, or that response is made to certain stimuli but not to certain others. *All these forms of compound reaction have an interest of their own,* which makes their analysis desirable; they enable us to trace the establishment and course of determining tendencies, the tendencies set up by the instructions; and some of them throw light upon the psychology of negative instruction (p. 250). Only, as we have said, they do not represent the different types of action. Things are now changing; but a great deal of work must be done before we obtain typical analyses of the actions discussed in the preceding paragraphs.

In one respect, this historical severance of the reaction experiment from the special psychology of action has been of scientific advantage; it has left experimenters free to employ the reaction method in any connection in which it promised to be of service. *The technique of the reaction experiment has, in fact, proved useful in many investigations, in which the psychology of*

action is not involved. Thus, we may measure the time required for response at different levels of *attention*, the time required (under various circumstances) for *recognition*, the time required for the *discrimination* of sensations whose stimuli are more or less alike, and so on. There are a great many experiments into which this feature of time-measurement may be introduced; and when they have been often repeated, and standard times have been determined, the times themselves and the numerical statement of their constancy become psychologically significant (p. 242); they indicate, in a sort of short-hand way, what the observer has done and how uniformly he has done it. One of the most valuable extensions of the reaction experiment, from the practical point of view, is the *association reaction;* words are shown or called out to the observer, who replies in every case by the first word that comes into his mind. This experiment may be performed with abnormal as well as with normal reactors, and the results are of importance to the alienist. It has also been employed with a view to the detection of crime: a series of words, some of which bear upon the circumstances of the crime, is presented to the supposedly guilty person, and the time of his response to the critical words is taken as an indication of his guilt or innocence. Under laboratory conditions, with 'crimes' invented for the sake of the experiment, some rather surprising results have been obtained; but there have also been flat failures; and no one can yet say positively whether the association reaction will have its place in the legal procedure of the future.

All these word-reactions move in the realm of meanings, which are the practically important things; there is no reason, however, why experiments of the kind described on p. 161 should not be accompanied by time-measurements. We have already suggested that moods might be timed (p. 227); and it is possible to measure the time required for the arousal of a sense-feeling, as well as to note its duration. On the whole, therefore, the reaction experiment or, as we may now term it, the **reaction method** should play an even larger part in the experimental psychology of the future than it has played in the past.

§ 60. **Will, Wish and Desire.** — The compound reactions have led us into a digression. But, if the traditional forms — the discriminative, cognitive and choice reactions — are off the main track of the psychology of action, they still throw light on the establishment of determining tendencies to action, and in so far contribute to the psychology of **will.** For will, taken in a psychological and not in a moral sense, is simply *the general name for the sum total of tendencies, inherited and acquired, that determine our actions;* and we distinguish different types of will, according as these tendencies to action manifest themselves, characteristically, in different ways. The man of strong will is one whose tendencies are so deep-seated and persistent that he attains his end, or at any rate continues to strive towards it, however remote it may be and however numerous the counter-suggestions that oppose it; and the man of weak will is one whose tendencies are so instable that he is at

the mercy of every fresh suggestion that comes. James remarks that, when the will is healthy, action follows, neither too slowly nor too rapidly, as the resultant of all the forces engaged; whereas, when it is unhealthy, action is either explosive or obstructed: the mercurial or dare-devil temperament shows an explosive will, "discharging so promptly into movements that inhibitions get no time to arise"; and the limp characters, the failures, sentimentalists, drunkards, schemers, show the obstructed will, in which "impulsion is insufficient or inhibition in excess." Divisions of this sort might be pushed much further; but here, as in the parallel case of temperament (p. 227), it is enough to indicate the lines along which classification may proceed.

The terms 'wish' and 'desire' come to us from popular psychology, and cover a great variety of actual experience. If we are willing to speak somewhat arbitrarily, we may say that a **desire** appears when some particular tendency to action, which has present control of the nervous system, is thwarted by external circumstances, while the goal of action is still regarded as attainable; and that a **wish** appears when some tendency to action rises to momentary dominance, but is promptly met by inhibiting tendencies, while the goal of action is regarded as unattainable. This statement of the difference between desire and wish will not fit every case, for the reason that the terms are popular, and not technical, and that their meanings are not sharply distinguished either in ordinary speech or in psychology. The experiences themselves, if we seek to compare them with the experiences discussed in previous chapters,

approach most nearly to *sense-feelings*. Desire is a straining-exciting, and wish a straining-subduing feeling; and both desire and wish may be either pleasurable or unpleasurable, according as the focal idea is the idea of result, of the goal of action, or the idea of its (present or permanent) inaccessibility. The existence of these ideas, however, and the play of associative tendencies which it implies, set desire and wish upon a higher plane of mental development than the sense-feelings; and the fact of direction, of the pressure of determining tendencies, marks another difference between the two kinds of experience.

This reference to sense-feeling reminds us of the doctrine, common to the associationist psychology and to modern popular psychology, that 'pleasure and pain' are the sole determinants of action. Bain, for instance, tells us that "the proper stimulus of the will, namely some variety of pleasure or pain," is always "needed to give the impetus"; "that primary constitution, under which our activity is put in motion by our feelings," remains unchanged through the whole history of mind. Spencer, as we have seen (p. 86), regards it as a corollary to the general law of organic evolution that "pleasures and pains have necessarily been the incentives to, and deterrents from, actions which the conditions of existence demanded and negatived"; our actions are always 'guided' by pleasures and pains, immediate or remote. Leslie Stephen, who is in the main a disciple of Spencer, writes in his brilliant *Science of Ethics:* "pain and pleasure are the determining causes of action; it may even be said that they are the sole

and the ultimate causes." And, lastly, — though the list of quotations might be greatly extended,—Professor Sully asserts that " the prompting forces in our voluntary action are feelings."

It is true that there is oftentimes a close relation between feeling and action; we gave some examples on p. 231. It is also true, however, that there are numberless actions into which feeling does not enter. The associationist school have, therefore, fallen into a mistake the opposite of that which we laid at their door on p. 161; *as they look at the course of ideas in too intellectual a way, so do they look at action in too emotional a way.* They also repeat a mistake which we noted on p. 146. There we found that an idea is supposed to have a ' power ' to recall another idea; Hume refers to association as " a kind of attraction " which one idea exerts upon another. So here the feelings are supposed to have a ' power ' to arouse or prevent or deflect actions; they are used to *explain* conduct, precisely as the laws of association are used to *explain* the course of ideas. Both these theories *betray a misunderstanding of the psychological problem.*

We must conclude, then, that the associationists are at fault in their observation; for even if the earliest impulsive actions (p. 244) were invariably preceded by feeling, — and that is a matter of guesswork, — it is still true that our present actions show no such uniformity. We conclude, also, that the explanation of action is to be found in the determining tendencies of the nervous system, and not in the motive force of feeling.

Questions and Exercises

(1) (*a*) It is said on p. 232 that " the present is a good time for repeating " certain cautions. Now that you have read the chapter, can you see why the statement was made? (*b*) Criticise, in your own words, the doctrine that pleasure and pain have ' power ' to determine actions.

(2) Give from your own experience instances (*a*) of sensorimotor and ideomotor action, and (*b*) of the passage of selective or volitional action into some simpler form. Make your account as detailed as possible.

(3) Draw up a table, in the form of a genealogical tree, of the various kinds of action discussed in this chapter. Write a psychological formula for every kind. Where does instinctive action come in?

(4) Give instances, from history or fiction, (*a*) of selective action, (*b*) of volitional action, and (*c*) of conflicts from which a volitional action might have resulted, but did not.

(5) Name (*a*) some of the principal human reflexes, and (*b*) some of the artificial reflexes most commonly acquired by civilised man.

(6) The following statements occur in various psychological works: (*a*) every impulse is at the same time emotion; (*b*) every emotion is at the same time impulse; (*c*) every emotion is at the same time instinct; (*d*) every instinct is an impulse. What comment have you to make?

(7) What evidence can you offer for the hypothesis (p.245) that impulsive actions are, in the history of the race, as old as tropisms?

(8) Suppose that you perform a selective action; the action issues from a conflict of determining tendencies; you ' decide ' among various possibilities of action. Does the decision always take place in the same way, or can you distinguish ' types ' of decision? — Do not hurry to answer the question; keep it by you, and answer it in the light of experience.

(9) We saw that the motor reaction (which has its counterpart in everyday life) is a telescoped impulsive action. Can you mention any other kinds of action (also occurring in everyday life) which do not find their precise place under the headings of the chapter?

(10) What kinds of action are involved in the product of constructive imagination?

(11) (*a*) What is the chief psychological difference between hesitation and deliberation? (*b*) Give, from your own experience, a detailed analysis of some desire.

(12) It is very important that you should become acquainted with the reaction experiment, and should analyse a number of reactions. Many instrumental outfits are on the market; one of the simplest is President E. C. Sanford's vernier chronoscope (C. H. Stoelting Co.). When you have familiarised yourself with the experiment, try to plan an experimental study of selective and volitional actions.

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CHAPTER X

THOUGHT

I myself am inclined to hold that man really thinks very little and very seldom. — WILHELM WUNDT

§ 61. **The Nature of Thought.** — "The train of thoughts, or mental discourse," wrote Hobbes in 1651, "is of two sorts. The first is unguided, without design, and inconstant; in which case the thoughts are said to wander, and seem impertinent one to another, as in a dream. The second is more constant; as being regulated by some desire, and design: and because the end, by the greatness of the impression, comes often to mind, in case our thoughts begin to wander, they are quickly again reduced into the way." Hobbes is here distinguishing, so far as unaided observation allows him, between the mental connections that reflect a random play of the associative tendencies, and those whose course is directed by some determining tendency. The former, to be sure, are never wholly random; ideas are grouped together by the situation in which they appear (p. 165); and it is only fair to say that Hobbes himself, in other passages, recognises this guidance. There is, nevertheless, a marked difference between the two kinds of 'mental discourse,' between (say) the casual flow of conversation and the working out of an argument; and it is the second kind, the progressive move-

ment of ideas towards an end, that modern psychology has technically named **thought**.

You notice that we have spoken of a 'progressive' movement; and you notice that Hobbes writes a little cautiously of regulated discourse; even in that, our thoughts may 'begin to wander.' These are merely different ways of saying that *thought goes on in the state of secondary attention;* it is an experience of the same general type as recollection, constructive imagination, selective and volitional action. We therefore 'think,' in the technical sense, far less often than the popular use of the word would suggest. For, on the one hand, we accept a great many judgements, ready made, from our surroundings; parents and teachers and friends are constantly expressing opinions which we adopt without question, opinions which they themselves have adopted, for the most part, in the same unquestioning way. The present generation takes the motor-car and the air-ship for granted; it finds them natural and obvious; and every generation falls heir to a body of social, political, religious, æsthetic, and moral judgements which also seem natural and obvious; thought is not needed, and so is rarely undertaken. Secondly, even if we are obliged to think, we still tend to think no further than is necessary for the practice of life; we attain a certain level of thought, in the mastery of our business or profession, and there stop; the pattern of secondary attention is replaced by that of derived primary attention. *Most of our thought*, in other words, *is either borrowed thought or routine thought*, that is, is not (in the psychological sense) thought at all; independent, sustained,

original thinking is as rare as creative imagination or as sagacious and farsighted action. In all probability, it always has been rare; our ancestors probably thought as we think, only a few with real seriousness, and they only between whiles; but a very little thinking gives man an immense superiority over the lower animals!

We have now to ask, first, about the *terms* in which thought goes on; and we shall find that it may go on in imaginal complexes, in words, and in mental attitudes. We then discuss the *pattern* of thought; and we shall find that thinking is characterised by the 'division into pairs' which we mentioned on p. 205. Lastly, we shall take up, separately, some of the special features of this general pattern.

§ 62. **Imaginal Processes in Thought: The Abstract Idea.** — A great deal of controversy has raged about the abstract or general idea. We can see to-day that the name is, psychologically, a misnomer. Just as no idea is, in its own right, an idea of memory or of imagination, so also no idea is, in its own right, an abstract idea; *an idea becomes, is made into, an* **abstract idea** *whenever its context and determination carry the meaning of abstractness and generality.* The associationists, however, looked at things differently; they thought that any idea which *means* 'abstract' must also itself *be* abstract; and so they distinguished a special class of abstract ideas. We obtain such ideas, they said, in this way: we review a large number of particular ideas, and we separate out the elements that are common to all of them; this common remainder is then a general

or abstract idea which represents the whole group of particulars. Thus, "by leaving out of the particular colours perceived by sense that which distinguishes them one from another; and retaining that only which is common to all; the mind makes an idea of colour in abstract which is neither red, nor blue, nor white, nor any other determinate colour."

An emphatic protest was raised against this theory by the idealistic philosopher George Berkeley (1685–1753). "The idea of man that I frame to myself must be either of a white or a black or a tawny, a straight or a crooked, a tall or a low or a middle-sized man. I cannot by any effort of thought conceive [that is, mentally picture] the abstract idea above described." It is, truly, a little difficult to *imagine* an abstract 'colour' with all the specific colour-elements left out! Yet the theory is so plausible, as long as process and meaning are confused, that it has been revived again, though in somewhat altered form. The suggestion has been made that an abstract idea is a sort of *composite photograph*, a mental picture which results from the superposition of many particular perceptions or ideas, and which therefore shows the common elements distinct and the individual elements blurred. A passage from Huxley illustrates this view. "An anatomist who occupies himself intently with the examination of several specimens of some new kind of animal, in course of time acquires so vivid a conception of its form and structure, that the idea may take visible shape and become a sort of waking dream. But the figure which thus presents itself is generic, not specific. It is no copy of any one speci-

men, but, more or less, a mean of the series." To which we reply that 'the figure which presents itself' is as specific and particular as any other idea; only, it *means* the genus; the anatomist is working under the suggestion of a type, of a composite picture that will make a diagram in a text-book or monograph; and his idea is abstract in virtue of this determination and context, and not because it pictures the mean of a series.

The fact is, to repeat, that *any idea is made into an abstract idea when context and determination carry the meaning of abstractness;* and there is no doubt that, in minds of a certain type, imaginal processes other than words may take on this context and suffer this determination, so that *thought may go on in imaginal terms.* Experiments show that visual imagery may play its part, along with verbal ideas and attitudes, in a single train of thought; one recent writer describes visual images of a complex kind as centres of 'activity' in the progress of thinking. Blindfold chess-players, if they are of the motor type, think of attack and defence in terms of 'lines of force' which connect the various pieces on the board, and which they themselves 'feel' in kinæsthetic imagery as pushes and pulls in hand and arm. We saw on p. 77 that such general notions as 'virtue' and 'commerce' may come to mind in the form of habitual images. No doubt, these images were at first contextual processes surrounding a verbal idea; they are therefore secondary, and not original; yet they may now replace the verbal idea, and do duty by themselves as abstract ideas. There are probably a good many of us whose abstract idea of 'triangle' is simply

a mental picture of the little equilateral triangle that stands for the word in text-books of geometry.

Is there, then, no truth at all in the theory of the composite photograph? Not an atom, so far as regards the genesis of the abstract idea; one might superpose individual ideas *ad infinitum*, and one would still have nothing more than an individual idea. But if we leave the abstract idea out of the question, and consider the *history of ideas*, in minds of the imaginal type, then the composite photograph has more to say for itself. For we know from p. 156 that the associative tendencies, if left to themselves, gradually die out; and that the weaker die out more quickly than the stronger. Consider what this means! I have a mental picture of a landscape, and I do not see the actual scene for some years. The picture fades out; but it fades out unevenly; its various features are correlated with associative tendencies of varying strength. So I shall always imagine a semicircle of mountains with the valley opening towards me, and the river meandering down the valley; for these are features common to many landscapes and strongly impressed upon my nervous system; but I shall lose the relative heights of the mountains, and the particular turns of the river, and the special distribution of villages and churches; for these are individual features, and have been less frequently repeated. *My mental picture of the landscape thus approaches a type;* and the same thing is true of all complex images, if they are left to themselves, and the underlying associative tendencies decay from old age. These typical images are, nevertheless, ideas of particular scenes or things or faces;

their rounding and smoothing do not make them abstract; while, conversely, the image that carries an abstract meaning may be as firmly outlined as a steel engraving. The typical image depends upon the inherent strength and weakness of associative tendencies; the abstract meaning is due to determinations which cut across the associative tendencies, perhaps to arrest or short-circuit, perhaps to rearrange them; there can be no necessary connection between typical image and abstract idea.

§ 63. **Thought and Language.** — It has often been said that thought would be impossible without words; and it is true that we can hardly conceive of human thought save as formed and embodied and expressed in language. Thought and articulate speech grew up, so to say, side by side; each implies the other; they are two sides of the same phase of mental development. The old conundrum 'Why don't the animals talk? Because they have nothing to say' contains so much of sound psychology; if the animals thought, they would undoubtedly use their vocal organs for speech; and since they do not talk, they cannot either be thinking. All this is true: and yet we must acknowledge that *thought is not necessarily wedded to speech;* it probably appeared, at least in rudimentary guise, before words came into being, and it persists (so to say) after words have ceased to be. There is a gesture-language that can serve as the medium of thought, and that is probably older than speech; and there is a thinking in images and attitudes that dispenses with words.

A **gesture** is *an expressive movement;* and all gestures have their origin in the movements that express emotion. But a gesture can serve as the medium of thought only if it is *made with the intention to communicate,* to impart some meaning; and it is this intention that seems to be the important thing, the specifically human endowment; though we can say nothing more of it now than that it is one of the ingrained tendencies of our nervous system (p. 135). Gestures, at any rate, can give rise to a language of their own; and we may study this language in various dialects; among deaf-mutes who have not been subject to special training; in the Cistercian communities, which are vowed to silence in the ordinary affairs of life; among uncivilised peoples, like the Indian tribes of North America; and finally in the lower strata of civilised societies, — here the Southern Italians are typical. There is a strong family resemblance throughout. We find that gestures express both the feeling-side and the idea-side of emotions; and we find, naturally enough, that *development has gone further on the side of idea,* where the gesture becomes a means for the expression of thought. The simplest kind of ideational gesture is the **demonstrative**, which points towards, directly indicates, the object that excites emotion; we point our finger at the thing that has frightened us, or shake our fist at the man who has made us angry. **Representative** gesture depicts the object: whether by a finger-drawing of its outline in the air, or by the reproduction of one of its characteristic features, or by some purely symbolic movement. Thus, a deaf-mute gesture for ' smoke ' is a spiral action of the forefinger

from below upwards; for ' child,' the action of cradling and rocking the right elbow in the left hand; for ' truth,' the movement of the forefinger in a straight line from the mouth. This gesture-language has its own syntax, its own laws of growth and change, its own psychological history; but it could not hold its own against articulate speech.

The struggle was, in all probability, brief; because, at the very beginning, *speech itself was a gesture;* the essential thing about it was not the sound, but the movement. If, then, gesture-language is older than speech, it can hardly be much older; for the sound that accompanied the gesture would soon attract attention, and the superiority of articulate sound over visible movement would soon be recognised. Attempts have been made, of course, — we may say ' of course ' at this point of our psychological knowledge! — to read a meaning into the sounds themselves. There is a theory which traces the origin of language to the imitation of natural sounds, and so makes it begin with words like *hiss* and *roar;* and there is a theory which traces it to ejaculations and merely mechanical utterances, and so makes it begin with *oh* and *ah* and a sort of infantile babble. Neither of these theories will hold water. Apart from the psychological arguments, which we cannot here set forth, there is the evidence of fact: words like *hiss* and *roar* form a very small part of the vocabulary of any language; exclamations and interjections are emotive and not ideational, and have had but little development; and the babble of the human infant is not primitive, but corresponds with a stage in the maturing of an inherited speech-mechan-

ism. No! *the sound was, at first, simply the incidental accompaniment of the gesture,* of a movement which included the muscles of the larynx; it derived its meaning from the gesture-context; and presently, under the influence of continued social intercourse, it proved its superiority to gesture and acquired its independence. We may say in the large that *the word heard has never had any other than a derivative and symbolic meaning,* and that *the self-sufficiency of the word-gesture, combined sound and movement, is the origin of language.*

What a word should 'mean,' therefore, depended in the first instance upon the context and determination of the articulated sound. Just as any idea may serve as an abstract idea, so may any word whatever serve as an abstract verbal idea, as what is technically called a **concept**, provided only that its context and determination carry the meaning of abstractness. We saw, however, that the context of the abstract idea may drop away, and the mental correlates of its determination lapse, so that finally some conventional image, like the triangle, is taken as abstract, wears the very stamp of abstractness upon it. This is preeminently the case with words. Every generation, we must remember, inherits the speech of preceding generations; *language comes to us ready made.* We learn from the study of language itself that the abstract words were originally concrete; thus the Latin *sapio*, to taste, *sapor*, taste, are connected with *sapa*, must, *sapo*, soap, *sebum*, tallow, — with the names of substances that are readily diluted or liquefied; but the situations that made them abstract dropped out of mind long ago. The child finds language

waiting for it, and finds that every word incorporates a meaning; and so it comes about, not only that the mental representation of honesty or pride may be the mere word, ' honesty ' or ' pride,' as it occurs in internal speech, but also that the same internal speech embodies the meaning of abstractness; *the verbal image stands psychologically for an idea and logically for a meaning.*

§ 64. **Mental Attitudes.** — If you look back over a course of thought, you will find verbal ideas, and you will perhaps find imaginal complexes of various kinds; but you will also find experiences of another sort, which have come to be known as **mental attitudes.** They are vague and elusive processes, which carry as if in a nutshell the entire meaning of a situation. *Some of them belong to the feeling-side of mind:* for feeling enters into the train of directed thought no less than into the freer play of association (p. 161): they are reported as ' feelings ' of hesitation, vacillation, incapacity, expectancy, surprise, triviality, relevancy, and so on. *Others are more nearly related to ideas;* they are generally reported by a phrase beginning with ' I knew that . . .,' ' I was sure that . . .,' ' I realised that . . .,' or some like expression. Suppose, for instance, that the observer is required to solve ' in his head ' some mathematical problem, or to think out the answer to some difficult question that bears upon his special line of study. He may say, in the course of his report: " At that point it occurred to me *that* I had lost the first partial product," " It seemed to me *that* the whole thing was taking too long a time," " I suddenly realised *that* I had never

thought of that before," " It flashed upon me *that* the question was only another form of the old difficulty," " I could not see the answer, but I knew *that* I could work it out," and so forth. All these *that*-clauses may stand for mental attitudes.

It is clear that, so far as the verbal expressions go, the observer is reporting meanings and not processes. Our task is, then, *to discover what processes lie behind the meanings; and here the opinions of psychologists are sharply at variance.* One party believes that the mental attitudes are unique and simple, that they cannot be further analysed, and that they must therefore be given rank as mental elements alongside of sensation and feeling. Another party, to which the author belongs, believes that the attitudes are analysable, if only they are taken out of the thought-context and examined by themselves under more favourable conditions, and that their analysis yields nothing else than sensations and feelings. The whole matter is still under discussion, and you will do best to suspend judgement. Meantime we may look at a couple of instances.

Consider, first, the attitude of **expectation**. It is not difficult to devise experiments which shall set up in the observer an expectant attitude; thus, in a very simple case, the experimenter might hang a weight by a cord to the ceiling, tie a loose piece of string to the cord, and light the end of the string; the observer would then watch the progress of the flame, *expecting* that it will presently reach the cord, burn that, and so cause the weight to fall to the floor. What are the processes in the observer's mind as he watches? You will naturally

think of an image; the observer will imagine the fall of the weight. Not necessarily; not even usually; *the image of expectation must go the same road as the image of recognition* (p. 184). *Ordinarily, expectation consists simply of kinæsthetic and organic sensations;* sometimes there are verbal ideas; only occasionally is there an image. If the experience is novel, *the sensations are likely to be tinged by feeling;* there is a trace of anxiety, of apprehension. Analysis reveals nothing more.

We have, then, in expectation a *directed* experience; the perception of the flaming string acts as a suggestion, turning the observer's mental processes into a single channel. The kinæsthetic and organic sensations derive in part from the bodily attitude of *attention:* tense muscles, inhibited breathing, adjustment of the organ of sight. Yet the observer is not merely attentive; the suggestion, the determination is there; and the sensations derive in part from that. They are *contextual* processes, and carry the meaning that 'so-and-so is going to happen.' They are therefore precisely like the 'sensations of intended movement' that characterise the motor reaction (p. 241); we might even call them, following that analogy, 'sensations of future occurrence.' All the same, they are, if we regard them as processes, just kinæsthetic and organic sensations, held together in a certain pattern by the perceptive suggestion; expectation shows nothing unique or ultimate behind or beyond them.

In course of time, if the situation is repeated, the feeling of anxiety fades away, and the experience be-

comes indifferent. With still further repetition, the 'sensations of future occurrence' also drop away; the suggestion from the flaming string then sets the organism, automatically, for the coming event; and the set has no mental correlates whatever.

A like procedure might be followed with vacillation, triviality, and the rest; and the outcome, in the author's belief, would be the same. It is less easy to attack the **intellectual attitudes**, those expressed by *that*-clauses. Suppose, however, that you have to write two letters: the one to an intimate friend, dealing with your home-life and things that have happened in your immediate circle, and the other to a business correspondent, regarding some contract that must be drawn up in precise terms. Do you not sit down to write with *a felt difference of bodily attitude*, almost as if in the two cases you were a different organism? There are different visceral pressures, differences of tonicity in the muscles of back and legs, differences in the sensed play of facial expression, differences in the movements of arm and hand in the intervals of setting pen to paper, rather obvious differences in respiration, and marked differences of local or general involuntary movement, — all of them deriving from the different suggestions or determinations which prompt the letters. Here, then, are two *thats:* 'I was sure *that* he would be interested in any gossip,' and 'I knew very well *that* I had to write carefully'; and the processes that carry these meanings seem, again, to reduce to a certain pattern of kinæsthetic and organic sensations, tinged very likely by feeling. *When observation reveals such a*

wealth of sensory processes, it seems unnecessary to assume a new mental element for the intellectual attitudes.

We saw on p. 4 that the concern of science is with facts. But just because facts are the staple of science, it is well that we should be a little jealous about them, that we should scrutinise every alleged fact as severely as our methods allow, and criticise it in the light of every possible theory. That is the present condition of the mental attitude; experiments are being made, and arguments brought forward, for and against its novelty and uniqueness; and the struggle must be carried through to the bitter end; for only in that way can the truth come stably to light. Meantime, those who are in the fight must of necessity take a side; the onlooker, as we have said, is well advised to await the issue.

§ 65. **The Pattern of Thought.** — There is a broad general *resemblance between the pattern of thought and that of constructive imagination;* it has indeed been said, though with exaggeration, that thought is an imagining in words, and imagination a thinking in images. The thinker, like the artist, sets out with a plan or design, and aims at a goal; and thought, like imagination, is a more or less steady flow, in a single direction, from the fountain-head of nervous disposition. 'Happy thoughts' occur in thinking, as they occur in imagination; there is a like movement between the poles of feeling; and the empathic experiences of the artist are paralleled by the mental attitudes of the thinker. In all these respects, the pattern of thought repeats what has been said on pp. 198 ff. of the pattern of constructive imagination.

Thought, however, has its distinctive features; for it is subject to two of the great directive tendencies that we mentioned on p. 205: the tendency to objectify, to find 'real things' in the world about us, and the tendency to dual division. The **tendency to objectify** underlies perception as well as thought; the earliest 'real things' were, we must suppose, external and material things; but with the growth of ideas the tendency bears also upon the things of mind, upon concepts and abstract ideas; these are taken *as* real in every case of thinking. The **tendency to dual division** is characteristic of thought; thinking is essentially divisive, even if the goal of thought is constructive. Here, then, is the main difference between thought and constructive imagination: that imagination proceeds to the exhibition of a single something, a statue or a picture or a poem; whereas thought proceeds to the exhibition of two somethings in relation, and ends with what the logicians call a **judgement**.

The tendency to dual division is so natural to us, and is impressed so deeply in our nervous make-up, that we can hardly hope to go behind it. We can hardly even describe a situation which calls for thought without presupposing the very tendency which is characteristic of thought. For what are the situations? They are *situations which ask a question;* and we cannot ask a question without putting it in the form of a judgement. Primitive man, wandering from place to place, comes back to a scene that he knew under other circumstances; the tree which was leafy is now bare, the river-bed which was full of water is now dry. If there is no feeling of

familiarity, and therefore no recognition, the situation may still *ask* him: 'Same?' and his reply 'Same scene; different features' is the reply of thought. He has tried to understand things; his secondary attention has played upon the scene perceived and the scene remembered; he has in the upshot divided the permanent from the changing, the 'thing' from the 'properties' of the thing; he has reached a conclusion, or formed a judgement.

All thought is of this kind, an answer to a question. Let us take the case of a scientific problem. Suppose that flints, which bear the marks of human workmanship, are found in a Pliocene bed, which has apparently remained undisturbed. The geologist is called upon to decide whether the deposit really has been undisturbed, so that the 'find' is reliable evidence of the existence of man in Tertiary times. The situation asks him a number of questions: has the bed been misplaced by faulting? can the materials have been brought to their present position by water? are there any signs that Quaternary man used the place? are the flints associated with bones of Tertiary animals? and so on and so forth. He forms a whole series of judgements; feature after feature of the situation is attended to, and every one in its turn is supplemented by ideas derived from previous knowledge; there is the familiar conflict of secondary attention, repeated over and over. Every judgement affirms or denies some property of the situation, in accordance with the original problem; and the outcome of the series of judgements, of the whole train of thought, is a final judgement, — still, of course, under the determination of the problem, — 'this bed has (or

has not) been disturbed'. If the flints themselves are only doubtfully of human workmanship, then the situation is doubly complicated; the questions and the partial judgements are more numerous; but the general pattern of thought is the same.

The tendency to dual division shows itself, then, in the form of the judgement, in the opposition of 'subject' to 'predicate'; it shows itself further in the grammatical distinctions of substantive and adjective, verb and object, verb and adverb. And *all thought or reasoning seems to reduce, in the last resort, to a succession of judgements which, under the particular suggestion or determination, exhausts the possibilities of dual division.* The duality, however, is not always obvious at first glance. Ideas are involved; and the arousal of a particular idea may mean the excitement of a whole nest of associative tendencies; subject or predicate or both may thus be supplemented in manifold wise; and the train of thought may appear to be variously and irregularly divided. Only a careful observation will show that these supplementary processes derive, not directly from the suggestive situation, but rather from the secondary excitement of associative tendencies. Moreover, the judgements themselves are not always explicit; they may occur in nutshell form, as mental attitudes. *The tendency to dual division is thus masked in two ways: by incidental associations, and by attitudes.* It seems, nevertheless, to underlie the whole structure of thought.

We are still in the dark as to psychological details. We have evidence that there is no psychological difference between an affirmative and a negative judgement;

but we do not even know whether the judgement, affirmative and negative, implies a specific mental pattern of its own, as the idea implies the pattern of core and context, or whether it may express a variety of patterns. On the whole, the latter alternative seems the more probable; *if there is any stable characteristic of the judgement, it is not a definite pattern or arrangement of mental processes, but rather a definite mental attitude,* the 'feeling of validity'; and this attitude seems to be allied to the feeling of familiarity in recognition, and so to be remotely akin to the emotion of relief. As far as our evidence goes, it appears to accompany every true judgement, that is to say, every judgement which is formed in the state of secondary attention. A 'feeling of relation' need not accompany the final judgement, but is likely to crop up here and there in the course of a train of thought, assuring us that certain things go together, belong to the same 'circle' of ideas, and that certain other things are contradictory, and cannot go together. These **relational feelings or attitudes** are contextual affairs, deriving probably from the kinæsthesis of bodily attitude; they are, however, very difficult to analyse, and their precise psychological nature is still in dispute.

In conclusion, let us revert for a moment to the comparison of thought with constructive imagination. We have said that the two are broadly similar; and we may now add that judgements occur in imagination, and fetches of imagination in a train of thought. The differences are, nevertheless, great enough to justify the popular distinction of the two mental modes; for *thought*

advances by repeated dissections of a situation which is taken as real, while imagination realises in the work of art a situation which at first was vague or fragmentary.

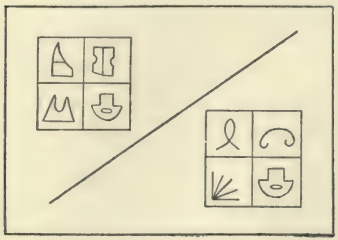
§ 66. **Abstraction and Generalisation.** — We have spoken of the abstract or general idea, as if the two adjectives were interchangeable; and *abstraction and generalisation are, in fact, only two phases of the same procedure.* When we abstract, we pick out the features of a situation that are relevant to our present determination, and neglect the other features. When we generalise, we bring to light resemblances that have been merged with differences; but this statement implies that we neglect the differences, as irrelevant, and pick out the likenesses, as relevant; generalisation is thus only a special case of abstraction. We have seen that every suggestion is double-faced, positive as well as negative; and we may perhaps say that in thinking of abstraction we emphasise the negative face, the discarding of the irrelevant, while in thinking of generalisation we emphasise the positive face, the bringing together of the similars which are relevant.

Experiments upon **abstraction** may be made in the manner outlined on p. 250: a complex stimulus (say, a visual stimulus that shows differences of colour, of number, of arrangement) is exhibited for a brief time; the observer is asked to attend to some one aspect of it (say, colour); and then, his report given, is asked to state what he can of the other aspects (number and form). Two general results may be mentioned. It is found, as might perhaps have been expected, that *things which*

make the least appeal to attention are also the things most easily overlooked. Colour and form, for instance, are more attractive than number; and when the observer is told to attend to colour or form, number may go entirely unnoticed; whereas, when he is told to attend to number, — a relatively difficult task, — he is still able to say something of colour and form. The result seems only natural; but you may not see at once that it throws scientific light on a matter of some practical importance. We all know from sad experience that when thought, our own or another's, flows smoothly and easily, it is likely to be superficial; the very smoothness of the flow means that difficulties have been overlooked. The obverse of this fact is, now, that if we struggle with the knotty points of a subject, we get a grip upon the whole; the interesting and attractive things take care of themselves; their native appeal to the attention keeps them in mind. So the experiments upon abstraction point a moral, at the same time that they illustrate the nervous mechanism of thought itself. They show, secondly, that *the negative effect of abstraction varies in degree;* the aspects of stimulus from which we abstract may be wholly suppressed, so that no report at all can be made of them, or may be apprehended indefinitely, so that the report is general; thus, form may be correctly named, while the colours are reported merely as 'different,' or as 'dark.' Another significant result! for it means that *a concept is more easily touched off than a special name;* we may fail to identify colours as red or blue when we can still say that they are dark or different. The reason is that the concept, the general name, is applied far

oftener than the special name; its associative tendencies are therefore both deeper seated and more numerous. We have a parallel case in the image of p. 266, which slowly loses its distinctive features and approaches a type; and we have others in the gradual decay of memory with old age: a grandfather may forget the names of his grandchildren, but he does not forget that they are 'boys' and 'girls.'

Experiments upon **generalisation**, that is, upon the positive abstraction of similars, have been made by the aid of meaningless forms, grouped as in the figure. The groups were of varying complexity, but always contained one common element; and the instruction given to the observer was that he should await the stimulus with as even as possible a distribution of attention, and then, when the figures appeared, should pick out the two that were alike. No less than six modes of procedure were distinguished. The observer might work actively through the forms, one by one; this is a laborious method, and was employed for the most part only in the early experiments of the series. Or he might travel over the groups, back and forth, until some figure struck him as familiar; this is the method of simple recognition. Or again he might start out on his journey of exploration, and find himself suddenly arrested by an insistent form, some figure that stood out more clearly



than its fellows. Here are mixed methods, part active search and part passive impression. In other cases, the two forms stood out in quick succession, as if the one had drawn the other after it; in still other cases, the two similars stood out simultaneously, sprang forth as if of their own accord. Lastly, in rare instances, passivity reached its maximum; the observer looked at the field, was at once held by some outstanding form, and knew that this was the form required, although he had not remarked the presence of its pair.

We cannot enter further into details; nor, indeed, is the time ripe for discussion; the experimental study of thought-procedures has hardly more than begun. You see, however, that *the pattern of thought may vary widely in certain of its features, while yet the outcome of thought, the abstraction or generalisation, is the same;* and this conclusion may help you to understand why there need be no specific mental pattern for the judgement.

§ 67. **Comparison and Discrimination.** — One of the commonest occurrences in a train of thought is the comparison of present with past, the harking back to a former stage of the procedure in order to make sure that we have not missed or mistaken some item of experience; and one of the commonest tasks set in the psychological laboratory reduces this comparison to its lowest terms. Two stimuli are presented, in succession; and the observer is required to say whether the intensity or quality of the corresponding sensations, the duration of the intervals, the magnitude of the forms, or whatever it may be, is the same or different. Both the stimuli

themselves and the time which separates them may be varied in all sorts of ways; and the mental processes involved in the comparison vary accordingly. Here we shall mention only two points, which bear upon the course of thought at large.

It is a tradition in psychology that the comparison of present with past experience implies the arousal of an *image;* we revive or reproduce the old, and then set its mental picture alongside the new. We have met a like tradition before, in our account of recognition and of expectation (pp. 184, 273). Nothing, however, can be more certain than that *the image is unnecessary; comparison may be direct, the immediate outcome of a determination; and if it is indirect, the processes involved need not be images.* Suppose, for instance, that you are comparing two tones, sounded in succession, and that you are to report upon their pitch; you are to say whether the second tone is higher or lower than the first, or of the same pitch. In very many cases, the second tone will evoke, at once and automatically, the report 'higher,' 'lower,' or 'same'; you find yourself uttering the word, without further experience of any kind; the whole procedure closes in on itself, very much as the impulse does in the motor reaction (p. 241). In many cases, again, the comparison will be indirect, but the intervening processes are sensations; strains appear in chest or throat, in forehead or scalp; the observers report a 'tightening' which means 'higher,' and a 'relaxing' or 'slackening' which means that the second tone is lower. We may suppose that these kinæsthetic processes are empathic; for in playing or

singing or listening to music we are likely to strain and hold the breath for high-pitched passages, and to relax and settle down for the low. Lastly, some imaginal complex may intervene; but even so it need not be auditory; the observer may picture a printed score or the piano keyboard, or may feel himself striking a note which is a semitone above or below another. *The auditory image plays a part in the comparison* only when the experiment is novel, when the second tone fails to touch off a response, or when there is a conflict of impulses to report; in other words, *only when the observer is hesitant and uncertain;* otherwise, it either fails to appear, or appears and is disregarded.

That is the first point: the second is that *comparison is often complete* — paradoxical as the statement may appear — *before the second of the paired stimuli has been presented;* we are ready with our answer before the full question has been put. If, for instance, we are comparing the intensities of successive tones, and if the first tone strikes us as unusually loud, or as ridiculously faint, then we are prepared to declare the second tone 'weaker' or 'stronger' before we have actually heard it. We receive from the first tone an *absolute impression* of loudness or faintness; and this impression — which, as we saw on p. 125, is our nearest approach to an intensive perception — suffices of itself to determine our report. Logically, we may be said to 'compare' the very loud or very faint tone with a tone of average intensity; psychologically, there is no comparison at all, but *a direct response to the absolute impression* made by the first term of the stimulus-pair.

It need hardly be said that these paragraphs do not offer, even in outline sketch, a psychology of comparison; they are not meant to; for here again the time is not ripe for full discussion. They should be enough, however, to drive home the lesson which the author intends: that *the course of thought, whether we take the pattern as a whole or consider separate aspects of it, is full of short cuts and condensations.* It is probably as impossible to unravel the psychology of thought, in every detail and to its first beginnings, as it is to unravel the psychology of perception. For our thinking is subject, not only to the inherited tendencies of the nervous system, but also to the stereotyped thought of our social surroundings; we are bred up in an atmosphere of meaning, and we hear words before we can speak them. If men do not use language, as Voltaire cynically said they do, to conceal their own thoughts, at least their facility of speech makes the psychology of thought almost insuperably difficult to their children.

Questions and Exercises

(1) We found, in the last chapter, that selective action does not follow directly upon impulsive action, but that there is between the two a stage of 'trial and error.' Can you instance any form of thought (from your own experience, or from drama or fiction) which corresponds with the stage of trial and error in action?

(2) Can you suggest the circumstances under which an 'intention to communicate' might naturally arise? Your answer must be speculative; but it must also be scientifically reasonable!

(3) How is articulate speech superior to gesture? Write fully; do not be satisfied with your first answer.

(4) Illustrate in detail, from your answers to previous questions in this book, the advantages and disadvantages of language as the vehicle of scientific description.

(5) In this chapter we have seen that speech replaces gesture; in § 51, we spoke of the conservatism of gesture, and said that the speech-metaphor might lapse while the gesture persisted. Is there any contradiction?

(6) It is said that the letters of the alphabet were originally hieroglyphics, that is, pictures of actual objects in the external world, and that they have only by very slow degrees become sound-symbols. Suppose this to be true: can you outline the course of change, in psychological terms?

(7) Try, as occasion offers, to analyse (*a*) the mental attitude of questioning, and (*b*) the feeling of validity; keep your notes by you, and try again and again. Compare your own results with those obtained by your fellow-students.

(8) James writes that "we ought to say a feeling of *and*, a feeling of *if*, a feeling of *but*, and a feeling of *by*, quite as readily as we say a feeling of *blue* or a feeling of *cold*" (Principles of Psychology, i., 1890, 245 f.): that is to say, we ought to speak of 'sensations of relation,' just as we speak of

'sensations of sight.' Do you agree? Answer the question, first, in general terms, from the point of view of a scientific psychology; and again in the concrete, after you have observed the mental processes that come with an emphatic *but* or *if*.

(9) An examiner sets questions which shall test his students' knowledge; he also sets questions in order to discover whether they have thought for themselves. How can he tell?

(10) How is it that one can carry a complicated sentence to a smooth grammatical conclusion, without knowing beforehand what words and what form of sentence one is going to employ?

(11) Arrange an experiment on comparison with simultaneously presented stimuli; an experiment, for instance, on the discrimination of hues or of lengths of lines. Outline a psychology of this mode of comparison. Is the comparison always direct? Is there any evidence of absolute impression?

(12) On p. 259 you were asked to distinguish various types of decision; and some of them, as you no doubt found, were *not* decisions in the proper psychological sense. Can you, in the same way, distinguish types of conclusion, and show that some of them (even after secondary attention has been at work) are not, in the proper psychological sense, judgements?

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CHAPTER XI

Sentiment

Assis sur un banc de Mail, M. l'abbé Lantaigne, supérieur du grand séminaire, et M. Bergeret, maître de conférences à la Faculté des lettres, conversaient, selon leur coutume d'été. Ils étaient sur toutes choses d'un sentiment contraire; jamais deux hommes ne furent plus différents d'esprit et de caractère. Mais seuls dans la ville ils s'intéressaient aux idées générales. Cette sympathie les réunissait. — Anatole France

§ 68. **The Nature of Sentiment.** — In ordinary speech, the word 'sentiment,' like the word 'feeling,' is used in many different senses; and, unlike 'feeling,' it has not settled down to a single meaning within psychology. We must therefore define it arbitrarily; and we shall reserve it, in this book, to denote *the feeling-complex which gathers about a judgement or an imaginative construction.* In emotion, we are brought face to face with an incident or situation which overwhelms us, takes possession of us; the emotion arises in the state of primary attention. A very strong and complex feeling is formed, and is rendered still stronger and still more complex by the organic sensations that come with our bodily attitude towards the situation (p. 216). In **sentiment**, we are also brought face to face with an incident or situation; but this is of a kind that demands secondary attention, effortful and divisive attention, now to one phase or feature and now to another. We take possession of it, so to speak, in place of its taking possession of us. Otherwise, the sentiment resembles

the emotion; a complex feeling is formed, and is reinforced by organic sensations; the bodily expression of sentiment is of the same kind as that of emotion. Suppose, for instance, that we sit down to a book by a new author. If we are actively and not passively interested; if we read critically, in the light of previous study and present knowledge; if we judge as we read; then our *felt realisation* of the aptness, fitness, rightness of the author's style is a sentiment. Or suppose that we are looking at a painting by a great master. If we can see how form and colour flowed straight out of the brush; if we can appreciate this fluency as the reward of toil upon toil, essay after essay; if our own critical vision can seize the painter's idea, and note the individuality with which that idea was conceived and is now expressed; then our *felt realisation* of the beauty of the painting is, again, a sentiment. These are examples offered from the standpoint of the critic; and such examples come naturally to mind, since criticism is both commoner and more articulate than creative art; but it need hardly be said that the artist too, as his construction proceeds, will have the same sort of experience, and probably in more intensive form.

The sentiment thus stands upon a higher level of mental development than the emotion; there is no other difference. And it follows from what we have said of thought (p. 262) that *the sentiment is a rare experience.* Just as there are many apparent judgements that are not really thought at all, so there are many apparent sentiments that are based upon borrowed judgements, and have never been anything more than feeling-attitudes,

more or less explicit; and just as secondary lapses into derived primary attention, so will a true sentiment lapse, with time and repetition, into a feeling-attitude. Hence, in describing and identifying the sentiments, we must be constantly on guard against confusing them with attitudes based on ready-made judgements, and with attitudes based upon what were once true judgements but are now matters of habitual acceptance. Our 'sentiment' of honour, for example, may never have cost us a moment's attention. A definition of honour has come to us, by tradition and precept, and we have accepted it without thought; situations which involve honour take possession of us, as emotive situations do, and we reply by the feeling-attitude. Or again, our 'sentiment' of beauty in pictorial art may once have been a real sentiment; we may have laboriously studied art-canons, have studiously dissected art-forms by secondary attention, have steeped ourselves in appreciation and criticism. Now, after all this labour, we have nothing but an attitude to a new picture; we 'instinctively' approve or disapprove of a work of art, without making any positive effort to analyse it. To talk, in these cases, about a moral or an æsthetic sentiment would be psychologically wrong; we experience simply two feeling-attitudes.

If, then, psychology were concerned simply with the part played in the mental life by the sentiments proper, the subject might be dismissed in a few words; the sentiments would figure in a text-book of psychology very much as the 'rare earths' figure in an elementary chemistry. We cannot thus dismiss them, and for two reasons.

In the first place, *the experience of a true sentiment*, in any one of the great departments in which sentiments may appear, — we shall mention them presently, — *leaves behind it a remarkably varied train of feeling-attitudes;* and these attitudes are thenceforward a permanent possession; we give illustrations in § 69. Secondly, *the experience of a sentiment, and the possession of the consequent variety of attitudes, enable one empathically to realise the attitudes and responses of those who, in other departments, have reached the same mental level.* Not only is there a 'freemasonry among artists'; there is a freemasonry among all men and women who have at any time really judged or constructed; so that the radical reformer and the conservative reactionary, the austere moralist and the disciple of art for art's sake, feel at home with each other, can get to close quarters with each other; their ideas and beliefs may differ as the east differs from the west, but — if they have honestly wrestled with their problem — there is a felt psychological community between them. The great writer who goes by the name of Anatole France has brought out this truth, in his own ironical way, in the quotation which heads the chapter. So that individually and socially the sentiments demand consideration; the attitudes which derive from them enrich and diversify individual experience, and establish a social bond of empathic understanding among those who would else be psychological strangers.

§ 69. **The Variety of Feeling-Attitude.** — Let us take an elementary example of the variety of attitudes which

follows in the wake of a sentiment. The sentiment which we select is one of those most widely attained: the *sentiment of fitness of literary style.* If, now, you read Lafcadio Hearn's *Japan,* — as who has not? — you cannot fail to notice the differences of paragraphing. There are paragraphs which follow one another in the ordinary way, without break. There are paragraphs separated by a blank space, the width of a line of print. There are paragraphs that begin with a dash. There are paragraphs separated by a line or triangle of asterisks. There are paragraphs which end with a series of periods. And these modes of connective separation, as we may be allowed to call them, are themselves variously combined.

Hearn has tried by such rather clumsy means to arouse in his reader the specific feeling-attitude in which he wrote. He tries to do the same thing, on a more minute scale, by his system of punctuation; and the net outward result is an unpleasant spottiness of page. Let us, however, keep to the internal; and let us consider only the paragraphing. If you pause to think of it, the paragraph-feeling itself is a somewhat subtle thing; a properly rounded paragraph gives you a feeling of temporary completeness, while yet it invites you to look ahead, leaves you in a certain suspense; a poorly finished paragraph gives you the same feeling of disappointment, of being 'taken in,' that you get from a weak ending to a stanza, or from a musical progression that fails to hold its tone-colour. The paragraph that is set off from what follows by a blank line rouses a feeling of greater completeness; you are to stop and take breath, to let your thought play back-

ward a little before you go on; still you are to look forward. The paragraph that begins with a dash opens up the subject from a new angle; you are to hold what you have read, but you are now to see it in a fresh light; the feeling is that of a pleasurable curiosity, with the prospect of reference forth and back. The paragraphs with asterisks between them are like different roads of survey in a country that you are touring; each one is complete in itself, but you are to remember them all for a future synthesis; at the moment you have a sense of relief, but this is mixed with a somewhat exciting responsibility; the author expects you to be ready for him when he comes to summarising. Lastly, the train of periods means a trail of feeling; the device, which is far more freely used by French than by English writers, invites you to let your thought play ahead a little, in the context of the feeling aroused by the paragraph, before you go on. Take the description of the local Shintō festival: "By immemorial custom the upper stories of all the dwellings had been tightly closed: woe to the Peeping Tom who should be detected, on such a day, in the impious act of *looking down upon the god!* . . ." Elementary enough, in all conscience; and needlessly emphasised by the italics; and yet tremendously effective; one's ideas trail off, in a context of feeling, from the seacoast village of Japan to the inland English town, from outraged godhead to the desecration of humanity; not sentimentally, or one has missed the writer's intention, but in a continuous train of attitudes which derive from literary sentiment. It is a pity, psychologically, that 'sentimental' is the adjective of

'sentimentality'; for sentimentality is at the opposite pole to sentiment, as sentiment is here used; but we cannot help the twists of language.

No doubt, a greater artist than Hearn would have printed his pages in the conventional way, and would still have made his appeal, without signposts, to the expert reader. Yet we may be grateful to him for a psychological object-lesson; he has given outward expression to a set of attitudes that we should otherwise have been obliged to seek and identify for ourselves. All the same, the attitudes would have been there, as certainly and definitely as if they had been indicated; and we could have found them, if we had ever experienced the sentiment of literary fitness. You see what enrichment of the life of feeling such a sentiment breeds, and you see how helpless we should be without it. The proverbs say *de gustibus non est disputandum*, and *quot homines tot sententiæ*, as if taste and opinion were matters of the merest chance. They are never that, however far they may lie below the level of sentiment and judgement; for there are solid uniformities of sense-feeling, and there is in every society a basal community of ideas; while, upon the higher level, they are as sure and as uniform as individual differences of talent and temperament allow. They are far more sure and far more uniform than the outsider imagines; technical discussion and technical appreciation have always a reasoned foundation of agreement. Competent critics may debate whether Whistler's picture of his Mother or that of Miss Alexander is the greater portrait; but think how much must be agreed upon before the debate can begin!

§ 70. **The Forms of Sentiment.** — Emotions go in pairs; an emotion is either joy or sorrow, either hope or fear; there is no midway emotion that is something between the two, but is neither the one nor the other. The sense-feelings, too, go in pairs; a feeling is either exciting or subduing, for instance, and cannot be anything between. When, however, the situation that arouses feeling is met by us in the state of secondary attention, then there is a third possibility; and *the sentiments, in fact, run in threes.* Here is a theory: is it true or false? If we judge it true, we have the sentiment of *belief;* if we judge it false, the sentiment of *disbelief.* But we need not come to a final judgement; facts *a*, *b*, *c*, we will suppose, tell for the theory, and facts *x*, *y*, *z* tell against it; we oscillate, uncertainly, between the two predicates 'true' and 'false'; and the result is the suspensive sentiment of *doubt.* Language is an unsafe guide in these matters; partly because the same term may stand both for sentiment and for feeling-attitude, but partly also because the sentiments, being less common than emotions, have not always received specific names. In principle, nevertheless, there is in every case a third sentiment, corresponding with oscillation of judgement, between the two extremes.

The three just mentioned, belief-doubt-disbelief, belong to the class of **intellectual** sentiments. An attempt has been made to examine them under experimental conditions; with the result that they prove to be of rare occurrence; that they are characterised in different minds — as might perhaps be expected, from the complexity of the situation — by different complexes, by

the kinæsthesis of bodily attitude, by internal speech, by the interplay of visual imagery; and that they are ordinarily replaced by the feeling-attitudes of certainty and uncertainty. The mental patterns of belief and disbelief turn out to be the same; and this result is psychologically reasonable; for the positive and negative of the terms are logical, an affair of meaning; so far as experience goes, disbelief is as positive as belief. Hence it is natural that both of them should be represented in feeling-attitude by the same 'certainty.' Another group of intellectual sentiments, less often named, but familiar to everyone who has set to work seriously to master a new writer or a new subject, consists of *agreement, obscurity and contradiction.* These have not, to the author's knowledge, been subjected to analysis; indeed, the present paragraphs can do little more than catalogue a few of the more obvious sentiments; the experiences are difficult to induce, and their detailed study is yet to come.

In the sphere of the **moral** or **social** sentiments, we have such opposites as trust-distrust, honour-dishonour, justice-injustice. There is always a suspensive sentiment, corresponding with oscillation of judgement, though its name can be made only approximative; we may, perhaps, speak of trust-trial-distrust, honour-ambiguity-dishonour, justice-equivocalness-injustice; think yourself into concrete situations, and you will get the meaning of the terms! Social situations are, however, of great practical importance; and we usually meet them, not by a sentiment, but by some emotion based upon instinctive tendencies; vanity, shame, pride,

sympathy are emotions of this sort. The same thing holds of **religious** situations. Triads like faith-perplexity-denial, communion-insecurity-estrangement point to the state of secondary attention; but in general the religious situation sets up an emotion.

We come, lastly, to the **æsthetic** sentiments. These are confused, by the majority of civilised mankind, with the emotions aroused by the *subject* of the work of art; whereas this subject is really of very minor importance; of no importance at all, if it is dictated by tradition and environment; and of secondary importance, only as it is chosen by the artist, from a number of possible subjects, because it allows the expression of personality or offers a test of difficulties overcome. What do you suppose Michael Angelo was trying to do when he painted the *Last Judgement*, or Titian when he painted the *Entombment of Christ?* The æsthetic sentiments are, in reality, those of success-bafflement-failure, ease-confusion-difficulty, approbation-criticism-condemnation, and the like. When Ruskin said "Everything that Velasquez does may be taken as absolutely right by the student," the unmeasured approbation expresses a true æsthetic sentiment; Ruskin had *worked* over Velasquez. When a recent writer on art directs us, in Millet's *Gleaners*, to "these forms bowed down by labour, these coarse habiliments, these work-hardened hands," he is outside the sphere of æsthetics altogether, and his appeal lies — at the best — to a social emotion.

These groups of sentiments, the intellectual, the moral or social, the religious and the æsthetic, are usually regarded as distinct and different. It is true that they are

called forth by different kinds of situation. We must remember, however, that *there are only two kinds of mental pattern involved:* the thought-pattern and the pattern of constructive imagination; and we have seen that these are themselves broadly similar. It is not likely, therefore, that the sentiments, or the feeling-attitudes that derive from them, differ in anything but inessentials from group to group; M. Bergeret and M. l'abbé Lantaigne felt in very much the same way. The variety of the feeling-attitudes is, indeed, surprisingly large; the point here is that this variety is essentially the same, whether one be sage or saint, artist or moralist.

§ 71. **The Situations and Their Appeal.** — If we wish to enquire into the nature of *the situations which arouse a sentiment,* two courses are open to us. We may undertake a study of origins; we may trace the history of primitive science and primitive art, and so on; and we may then try to generalise, both as regards the circumstances which called forth the scientific or artistic response, and as regards the appeal that such circumstances make to the human organism. Or we may turn our attention to acknowledged masterpieces, and try in like manner to 'get behind' them; trusting in this event rather to the typical than to the general. Both courses have been followed, and followed assiduously; but the outcome is still uncertain.

The tendency has been to refer a group of sentiments to some single root in human nature. That is only natural; for it is always satisfactory to simplify; and when once the investigator has hit upon what he takes to be the

primule or germ of later development, he is prepared to accept whatever makes for his theory and to reject whatever tells against it (p. 98). Yet we must remind ourselves that man's instinctive tendencies are not carried intact throughout his history; man reasons, as we said (p. 210), on the basis of fragments of instinctive tendency, disjoined from their original connections and recombined to suit the occasion. *We may, for instance, refer the intellectual sentiments to a native curiosity* (p. 205); but what is curiosity? A very mixed medley of instinctive responses: Professor Thorndike includes under it "attention to novel objects and human behaviour, cautious approach, reaching and grasping, the food-trying reactions of putting in the mouth, tasting and biting, general exploration with the eyes and manipulation with the hands," as well as "the love of sensory life for its own sake." Again, *we may refer the moral and social sentiments to a native sympathy or empathy;* but here, also, we should find, in the concrete, a mixed medley of particular responses. These references are, nevertheless, fairly satisfactory. What shall we say of religion and art?

There seems to be no original artistic tendency or art-instinct. In primitive times, the body was decorated with a view to attracting notice, and especially to attracting a mate. Then, by slow degrees, decoration travelled from person to surroundings: first, from the body to the clothes, and then again from clothes to house. But as the primitive house is a rude structure, and its owner poor, not much can be done by way of individual house-adornment; and so we find the members of a tribe

clubbing together, so to speak, to decorate the common house, the temple. Æsthetics now enters into the service of religion.

Again: as the tribes settled down to agricultural pursuits, man became a labourer and learned to work; systematic and regular work grew to be a necessity. But work means play; if we labour, we must also have recreation. How, then, shall grown-up people play? They have lost their interest in childish games. Æsthetics comes to the rescue; art is the play, the proper recreation, of grown-up workers; we speak, and speak rightly, of Shakespeare's 'plays' and of 'playing' the violin. Æsthetics has now lost its distinctively religious meaning, and has been turned to secular purposes.

In no less than three ways, therefore, has æsthetics proved itself to be of practical importance. It has been useful in courtship; it has been useful as enhancing the impressiveness of religious ceremonies; it is still eminently useful as the play of adults. *Curiosity and empathy have both entered into it;* curiosity in the manipulation of shells and feathers, of brush and cutting edge; empathy in the affairs of courtship and worship. Further than this we can hardly go. The psychological essence of tragedy, in Hamlet or Antigone, and the psychological essence of comedy, in Dogberry and Verges, still escape us; there are many theories, but no one of them is convincing.

It seems, also, that *there is no specific religious tendency or instinct.* Religion has been ascribed to fear, to an instinct of dependence, to an instinctive recognition of the infinite, and so on; but modern writers agree

that it cannot derive from a single source. "Religion," says Professor Leuba, "is rooted in instinctive impulses and in instincts, — in fear, acquisitiveness, pugnacity, curiosity, love, etc. But the relation that instinct bears to religion is no other than that obtaining between instinct and commerce or any complex social activity." Religion, like art, has a strong practical sanction; the worshipper expects to control the forces of nature, and to secure the action of gods and spirits upon human minds and bodies; while religion itself satisfies the desire for power and for social recognition, quickens intelligence, and regulates and unifies the community. We understand something of the growth of religious ideas, as we know something of the development of art; but the contents of a religious system, and the products of artistic construction, do not take us far towards the explication of human tendencies.

In a word, then, the problem which we have here formulated is too difficult for solution now or in the near future. We cannot 'get behind' the masterpiece, the achievement of civilisation; the conditions are too complex. We cannot draw any certain conclusion from the study of origins; for primitive man, as we know him, is very like ourselves, both in convention and in reasoning; Professor Boas finds no evidence that "hereditary mental faculty has been improved by civilisation"; the savage may be untutored, but he is as complicatedly human as the best of us. We can say, negatively, that *neither the situations which are met by sentiment nor the tendencies to which these situations appeal are unique;* and that is, in itself, something gained.

No genuine problem is insoluble; and further work, partly along the older lines and partly perhaps by new methods which bear directly upon man's instinctive tendencies, will some day answer the questions raised in these paragraphs.

§ 72. **Mood, Passion, Temperament.** — With lapse of secondary attention, the sentiments lapse, as we have seen, into feeling-attitudes. It appears, from ordinary observation, that they may also persist, in weakened form, as **moods**. Thus, the moods acquiescence-indecision-incredulity correspond with the sentiments belief-doubt-disbelief; and we speak of a critical humour, a religious frame of mind, and so on. It is doubtful whether the sentiments rise to the intensity of **passion**; we speak, it is true, of a passionate humility, of a passion of disapprobation or of renunciation; but it is probable that these experiences are emotive, singly and not multiply determined.

A detailed classification of the **temperaments** would include forms characterised by special susceptibility to sentiment and by type of response, intellectual, artistic, and so forth. Meantime, the crude fourfold arrangement of p. 227 seems to cover the cases: the ascetic temperament, for instance, falls under the melancholic, the critical under the phlegmatic, the 'artistic' of current speech under the choleric or sanguine.

Questions and Exercises

(1) What do you mean by 'style'? Do not write commonplace; think the question out, and answer it in psychological terms.

(2) Have some argumentative passage read aloud to you. Notice how the intellectual feeling-attitudes rise and disappear, as the argument proceeds. Differentiate them, and try to give them names; mark the sentences which call them forth; try to determine if their nature and arousal correspond with the writer's intention.

(3) What modes of feeling-response may be aroused by music? Illustrate, if possible, by actual examples.

(4) Are there any movements that characteristically express certain sentiments, as clenching the fist (for instance) expresses anger?

(5) Matthew Arnold defined poetry as "a criticism of life" (look up the passage, in the Preface to Poems of Wordsworth, and be sure that you understand it!). Does this definition suggest any further field of usefulness for æsthetics? May æsthetics properly be extended to cover it?

(6) How does 'curiosity' differ from 'inquisitiveness'?

(7) Can you recall any characters, in literature or fiction, who might stand as embodiments of some social or religious sentiment?

(8) Two traditional explanations of the ludicrous are (*a*) the theory of degradation: that when we laugh we are realising our own superiority, and (*b*) the theory of incongruity: that the comic situation always involves a nullifying of expectation. What criticisms can you offer?

(9) What sort of temperament are we thinking of when we agree to call Shakespeare, Cervantes, Goldsmith, Sterne, Lamb, Dickens and George Eliot 'humorists'?

(10) Aristotle lays it down that tragedy "accomplishes by pity and fear the purgation of such emotions." Can you read a positive and definite meaning into this statement?

Can you rephrase it, in terms of our psychology of sentiment? Is it then adequate?

(11) How do we know that a greater artist than Hearn would have printed his pages in the conventional way? What means has an author, who does print in the conventional way, of emphasising the points at which he wishes feeling-attitudes to arise?

(12) You should analyse some sentiments at first hand. Ask a friend to write out a number of descriptions, statements, questions, that have evoked in his own experience the sentiments (say) of belief and doubt, or of honour and ambiguity. Let him arrange them in pairs: belief-doubt, honour-ambiguity. Then take a pair, and read the two statements in quick succession. You will be surprised to find how matter-of-course and indifferent your attitude is; but presently some member of a pair will grip you, start you thinking; and you will then have the opportunity to observe. Write out (or better, dictate) a full report.

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CHAPTER XII

Self and Consciousness

The savage commonly fancies that the link between a name and the person denominated by it is a real and substantial bond. In fact, primitive man regards his name as a vital portion of himself, and takes care of it accordingly. — Sir James Frazer

§ 73. **The Concept of Self.** — We said on p. 9 that the word *mind* is used by the psychologist as an inclusive name for all the phenomena of the psychological world, that is to say, of the world *with man left in*. We then found, on p. 10, that the *man left in* reduces to a functional nervous system. This means, of course, that there are as many psychological worlds as there are separate nervous systems; so that *the* psychological world, which the psychologist tries to describe, is in reality an average or generalised world; though the observations upon which his descriptions rest are always made upon this or that particular world. The same thing holds of any science. A boy picks up a bit of jagged stone, and with a jerk of his wrist flips it across the road. No physicist could tell you the exact course described by that stone, and no physicist wants to. Physics deals with the ideal course of ideal projectiles hurled under fixed conditions; the boy and the jerk and the jagged stone are all generalised away into some mathematically smooth trajectory. The observations

of physics, on the other hand, are made by men working under conditions that are not ideal, and using instruments that differ from the wrist and the stone only in degree, not in kind; the smooth curve is derived from data all of which have their margin of empirical error.

Psychology, however, just because it has to do with a world in which man himself remains, is in a different case from the physical sciences; it has to take account of the **self.** *The concept of self is not solely psychological;* it is a common-sense concept; and like all the constructions of common sense it has three sides, philosophical, practical, and scientific. It is *philosophical*, in so far as it involves an attempt to explain or to rationalise the facts of observation; and it evidently does that; the notion of self is a way of explaining the continuity of memory and of conduct; I remember my past because I am I, and I behave in this way or that because it is 'like me' to do so. The concept is also *practical;* common sense rates a self as gifted or energetic or lazy of improvident; it is always valuing or estimating some Him or Her, some You or Me. It is further *scientific*, that is, psychological; for the self thus rated is some particular combination of talent, temperament and character, and the continuity which the self explains is some particular mental constitution, intellectual, emotive, active; one cannot at all define the 'person' or 'individual' of common sense without using psychological terms. So that psychology, if only in self-defence, must have its say in the matter, and must recast the self from its own point of view.

The recasting is not difficult. *A self, in the psychologi-*

cal sense, is one of the particular psychological worlds. It is not mind, but *a* mind, the mental phenomena correlated with a particular nervous system, and arranged and determined in accordance with the tendencies of that system. We have made no mention of it hitherto, in this book, because our main business has been with general psychology, and we have had no need of it. Psychology, however, does not confine itself to the generalised world: and that is how it comes to be in different case from the physical sciences, and takes account, not only in self-defence, of the concept of self. If you go back to pp. 31 f., you will note that there is a **differential psychology**, a psychology of individual differences, as well as a general psychology. The variation of mental processes from observer to observer, and the limits and manner of this variation, are indeed just as much matter of observable fact, and therefore just as proper a subject for scientific enquiry, as their uniformity; and as the incidents of a man's career may be set forth objectively, without praise or blame, in a biography, so may his psychological self, his mental processes in correlation with his nervous system, be set forth in a **psychography.** We ourselves, although we have been occupied with general psychology, and have for the most part spoken of 'practised observers' as a physicist might speak of 'a sensitive galvanometer,' without going into particulars, — we ourselves have, nevertheless, found frequent occasion to mention individual differences. The facts that we have thus touched upon incidentally are worked up, systematically, by differential psychology.

The concept of self is, however, a common-sense con-

cept; it has, as we have seen, its practical side; and you will understand, therefore, that *the differential study of selves has a high practical importance.* Such a study is not rigorously or exclusively psychological. But since certain 'mental traits,' and certain combinations of them, may render a man fit or unfit for a proposed business or profession, it is important to know in what degree these traits are present; and here the psychologist is of assistance; he has helped to devise 'mental tests' which serve to identify and measure them. It is also especially important to know what traits are likely to be found together, and in what degree. This problem has been vigorously attacked, of recent years, on the side of intellect; and while the details belong to a chapter in practical psychology (p. 33) which we cannot here open, there is one result, at any rate, which should find a place in a scientific text-book. There seems to be no doubt that *the individual nervous system possesses, over and above its special habits, susceptibilities, tendencies, and activities, a characteristic manner of functioning at large;* so that a **common or general factor** enters into all the special intellectual responses that are called forth by particular situations. It is not easy to make this result clear to the reader, mainly because no one has as yet a clear idea of what the common or general factor is; we have good evidence that it exists, but we can say very little more about it. Different names have been given to it: 'energy of attention,' 'general ability,' 'intellective energy,' 'general intelligence'; but they indicate the way in which it manifests itself, and not its own nature; the best name for the

present is the vague ' general common factor.' We do not know, either, upon what it depends: on blood-supply, perhaps, or on the arrangement of nervous structures, or on some individual ' quality ' of the nervous elements, or perhaps on something else that we cannot even guess at. What it does is to hold a man's intellectual traits together and to enter into the exhibition of them all; *it is thus, from the psychological point of view, a sort of supreme determining tendency, guiding all mental processes whatsoever into the channels of intellectual selfhood.* Whether there is a like general factor on the emotive side, and whether ' emotive energy ' is of the same kind as this ' intellective energy,' cannot be said.

One further point! We have been careful, in dealing with the common-sense concept of self, to distinguish its three aspects, philosophical, practical, scientific; but *we have drawn the limits of this self more strictly than everyday usage warrants;* and we must now correct that error. Common sense, as we remarked on p. 2, is likely to confuse the Me with the Mine, and the Him with the His; the self is extended from personality to possessions. The confusion of Him and His is a natural consequence of the practical reference of the concept; the easiest way to rate or estimate another person is to consider his property, his sphere of influence, his social prominence; and these things, which are a part of the other person's value, thus become for us a part of himself. The confusion of Me with Mine has a different origin. Intellect, temperament and character are based upon habits, and habits imply an habitual surroundings; we are ' not ourselves ' when we leave our accustomed

groove. No doubt, each of these sources of confusion intermingles with the other; we are not concerned, however, to follow them in detail.

§ 74. **The Persistence of the Self.** — A full account of the self of common sense, in so far as this self calls for psychological treatment, belongs to social and not to general psychology; and the discussion therefore falls outside the scope of the present book. We must, however, say a word about that *observed continuity of memory and conduct* which the concept of self, on its philosophical side, professes to explain (p. 308); for the notion of the **persistence of the self** has had a marked influence, as we shall see in § 75, upon this chapter of general psychology.

We are all of us disposed to take the persistence of the self for granted. Do I not now remember what I did and thought and felt when I was a small child? and do I not now act in accordance with my character, as family and friends expect me to act? Surely the thing is obvious: the organism is physically continuous, from infancy to old age; a likeness of interest, of skill, of aptitudes, may be traced from childhood to manhood; and the discovery of the ' general common factor ' in the intellectual sphere only confirms what we knew before. The child becomes the adult, and the adult passes into senility, while the self remains the same, — growing and developing and shrinking, to be sure, but essentially unchanged throughout. *That is the natural view;* and for the most part it goes unchallenged.

Let us see, however, whether it may not be questioned.

We remember; that is true; but we also forget. The fact that certain past events are remembered tells more heavily, in common-sense thinking, than the fact that very many past events are forgotten, simply because it is human nature, as Bacon said, to give more weight to positive than to negative instances; but science does not emphasize; science takes all the facts at the same level. The organism, again, is physically continuous, and 'the child is father of the man'; but who makes these observations? Not I, who am the continuous organism, but — in the first instance, at any rate — my fellow-men, those who are about me; and my fellow-men clinch their observations by the bestowal upon me of a personal name. In primitive thought, the superstitions that connect the name with the personality are legion; and even to-day our own name is warmly intimate, a very factor of our self. This name, which forms part of us and holds us together all through life, comes nevertheless from the outside; we do not name ourselves! Consider, further, the influence of language in general. It is clear that language, as it developed forms of speech in accordance with the common-sense notion of self, would powerfully reinforce that notion; the words and phrases which at first expressed ideas would come, in time, to shape or suggest ideas. The common-sense view is thus accepted as natural; but there is no proof that it is correct.

Suppose, then, that we openly challenge that view; *what can we urge against it?* We find, first of all, that *language* bears witness against itself. We say that a man is at times 'out of himself,' 'not himself,' 'beside

himself'; we say that he forgets, surpasses, loses, disregards, neglects, discredits, contradicts himself; we say that he does himself injustice, that he cannot contain himself, and so forth. Our *daily life* bears witness to the same effect. A man may be suave and affable in business and a veritable bear at home; and the man who sits as judge upon the bench, and plays a beginner's game upon the golf-course, and carries his little son pick-a-back to bed, is he the same self in all three situations? There are changes of selfhood so abrupt that they remind us of the 'mutations' of the biologists: religious conversion, loss of fortune, sudden elevation to a position of responsibility, disappointment in love, may make 'another man' of the man we knew. The seven ages, we might almost say, correspond with as many different selves; it is a common remark that so-and-so has not fulfilled the promise of his youth, and that so-and-so is no longer the man he was. *Pathology* brings corroboration of the most striking kind; there are cases of **dual or multiple personality**, in which the same 'individual' shows at different times very marked differences of intelligence, emotivity and conduct, differences so marked that the same organism appears as two or more distinct 'selves'; and these selves may be wholly separate in experience, so that one self has no knowledge or memory of the experiences of another. Here, therefore, the abnormal is a more trenchant and clean-cut figure of the normal; it is the normal carried, so to say, to its logical extreme. The judge delivering a charge does not think of his golf, and the irritated golf-player does not think of his charge; but in the abnormal cases

the division may be complete; the one 'personality' *cannot* think of the other.

If, then, there are facts which look toward the persistence and continuity and stability of the self, there are also other facts which look toward impermanence and discontinuity and instability. Common sense has laid stress upon the positive evidence, and has enshrined in language the concept of a persistent and continuous self. This one-sided attitude, as we are now to see, has had its effect upon psychology. We have carried the present analysis only so far as was necessary for our own purposes; the full psychological discussion of the self of common sense belongs, as we said just now, to another branch of the science.

§ 75. **The Self in Experience.** — So far, we have been discussing the psychological self as viewed, so to say, from the outside; we have found out what the word 'self' means when it is used as a technical term like 'mind' or 'memory.' We have now to raise a different question, and to ask: *How is* **myself** *represented in experience?* There are very many occasions when the organism is, literally, thrown back on *itself*, when it meets a situation by a *self*-response; what mental processes are then involved?

Self, in such cases, is a meaning; and, in principle, *any mental process whatsoever may represent the self* (or the phase or feature of the self that is called forth by the situation) *if its context and determination carry the meaning of selfhood.* We can hardly expect, however, that the context and determination will be explicit,

a group of mental processes lying open to observation. For the meaning of self is very old in human history; and we learn from early childhood to speak a language in which it is already stereotyped, a language which bristles with *I* and *my*. We shall say more about language later. Meantime, you see that these are just the circumstances in which context and determination cease to be explicit, and reduce to a set or disposition of the nervous system (p. 120). Hence we must be satisfied to distinguish the *forms* in which the self-experience appears, and to discover what *particular mental processes*, if any, fall characteristically into these self-forms. In other words, we enquire whether the self-meaning attaches to a perception, or an idea, or a feeling, and so on down the list; and we enquire also whether the self-perception or self-idea, or whatever the form may be, is characteristically visual or auditory or kinæsthetic, and so on. In principle, remember, any form and any kind of process may represent the self, provided that the self-context and the self-determination are somehow there; we are now to gather observations, and to see what forms and what processes do, in fact, represent the self in our experience.

Let us begin, however, by clearing out of the way certain **erroneous views** that have appeared in psychology under the influence of common sense. Since the self of common sense is persistent, it has been argued that the self-experience must also be continuous; and psychologists, instead of going to the facts, have tried to find a basis in experience for this supposed continuity. *It is sometimes said, for instance, that all mental processes*

alike are essentially self-processes; because they are processes within a particular psychological world, *because* they belong to a self, *therefore* they have the character of selfness stamped upon them, and are known and experienced as processes-of-me. Does that view seem to you to be natural and reasonable? But consider the logic of it; try a parallel argument! We might as well say that *because* every native-born American belongs to the group of American citizenship, *therefore* he is always aware that he is an American citizen; or that *because* a certain man is wealthy, *therefore* he is always aware of his possessions. The fallacy is plain. *It is sometimes said, again, that not all mental processes alike, but only the feeling-processes* — sense-feelings, emotions, sentiments, feeling-attitudes — *have this character of selfness stamped upon them;* the feelings are 'subjective' experiences, and therefore being with them a reference to the self. The confusion is the same as that which we have just pointed out; it is argued that, because all the feeling-processes *are* subjective (we need not enquire too curiously what that word means!), therefore they must always *mean* the great subjective thing, the self; because a man *is* wealthy, therefore his wealth must always *mean* wealth to him; whereas it may, in various circumstances, mean an oil-painting or a steam-yacht. There is, however, another objection. This view maintains that feeling-processes of some kind are always present in experience; otherwise, indeed, they could not continuously refer to self; but observation shows that much of our experience is indifferent, without tinge of feeling. *It is sometimes*

said, once more, that the organic sensations are the peculiar self-experiences; they are always with us, forming a constant background of self, upon which our other and less stable experiences come and go. But it may be doubted whether these sensations are continuous; at any rate, they vary enormously in intensity and in their appeal to the attention. An experience of nausea is overwhelming; but need there be, in perfect health, any sensation whatever from heart-beat or breathing or digestion? Moreover, the logic of the position is still unsound. For a continuous experience is not necessarily the experience of something continuous; the fact that a man is all the while wealthy does not imply that he is continually realising his wealth.

Having thus cleared the ground of bad argument, we may turn to the facts of observation. The question whether the self-experience is or is not continuous we leave, for the moment, entirely open. We ask, first: *In what form or forms does this self-experience occur?* and the answer is: In all possible forms. We may *perceive* ourself, as when we consult the glass to make sure that we look all right; we may have an *idea* of ourself, in memory or imagination; we may have a *feeling* of self, when we are lonely or vexed or ill at ease; we may have a *concept* of self, as when we say emphatically in conversation '*I* can't conceive of so-and-so'; we may have all sorts of *self-attitudes*, intellectual and emotive. Any form of mental connection may appear under a determination, or in a context, that gives it the meaning of self; only be clear that it is always the determination or context, and not the form, which is re-

sponsible for the selfness of the experience. We look in the glass, time and again, without having a self-perception; and we are often lonely and uncomfortable, without having a self-feeling; and we may say 'I' a hundred times over, without having a self-concept. The setting is what gives the self-meaning to the experience.

We ask, secondly: *Are there any particular mental processes that enter characteristically into the self-forms?* and here the answer is less easy. We have seen that language has a large number of self-words ready made for us to use; and we learn in our early years — sometimes painfully enough — to connect the self with our body. So the perceived self tends to be a visual perception of the body, or of some part of it; the felt self tends to be a blend of feeling with kinæsthetic and organic sensation (these processes are, indeed, regular components of feelings and mental attitudes); while the conceived self is, of course, a matter of verbal perception and idea, — ordinarily, that is, a matter of auditory-kinæsthetic complexes. If, however, these processes are characteristic, we have no evidence that they are essential; continued observation would probably show that the self-meaning may attach to all sorts of processes, as it is carried by all sorts of forms, so that tones and touches, tastes and smells, may on occasion come to us as the experienced Me.

On the whole, therefore, what holds in principle of the *form of the self-experience* holds also in observable fact; the experience may take all possible forms; though, in a given mind, some forms may appear more frequently

than others. Within the different forms, on the other hand, there seems to be a tendency toward the appearance of *particular mental processes*, those concerned in the visual perception of the body, in felt organic stir and in verbal perceptions and ideas. And now, *what of continuity?*

Prejudice is strong; but you must be ready to discard it. *Experimental and everyday observation both testify, when the question is directly put, to the intermittence of the self-experience.* We are not always aware of our self. The self-experience does not appear, for example, when we are engaged in our ordinary routine employment. It does not appear in concentrated thought; the views and theories which a popular psychology regards as personal are, as a rule, quite selfless in their forming and phrasing. It does not appear when we are absorbed in a novel, or a play, or the hearing of music. It need not appear in many of the situations that are designated by self-words. The very fact that we can call it up at will, that we can 'come to ourselves' whenever we like, indicates that it is not always present in our experience. *It is the specific expression of a special determination;* and the frequency of the determination varies, we must suppose, in different cases; some of us are continually recurring to a self-experience, while others find it a more casual visitor.

You should not accept this conclusion blindly; you may test it in your own experience. Notice meanwhile that, if it is sound, it throws further light upon the theories of pp. 316 ff. Mental processes are not always experienced as self-processes, but all mental forms and

probably all mental processes may lie under the self-determination. Feelings do not always bring a reference to self, but the self-meaning is very often carried by a feeling. The organic sensations are not always self-experiences, but a self-feeling may be largely composed of organic processes. If we have dismissed the theories themselves, we must still credit them with the measure of truth that they contain.

§ 76. **The Snares of Language.** — You were warned on p. 36 that language may be misleading, and that the phrases which you naturally use oftentimes imply a view of the world, or an attitude towards experience, which is foreign to science. Nowhere, perhaps, is this discrepancy greater than in the phrases which refer to the self. Language, as we know, is older than science, and expresses the results of common-sense interpretation rather than of factual observation. *The self of language is, accordingly, not the psychological self, but the counterpart of the mannikin-mind* (p. 7); and just as we must be on guard, and remember our psychological definition, whenever in a psychological context we say or think the word 'mind,' so must we be on guard against the common-sense notion of 'self' that has insinuated itself into a thousand turns of familiar speech. An observer, describing a particular experience, may say, quite naturally, 'I find no trace of self-reference!' — and there is no harm done, if we realise that the *I* of his remark is the traditional self-concept of language, and the *self* the psychological experience of self; but there may be very great harm, if likeness of words leads us to confound the

personal with the impersonal, common sense with science. Only by an unreadable pedantry can we avoid the I-phrases and the other personal sentences; but we must always bear in mind that *language, the very form and structure of it, embodies a theory, an explanation or interpretation of the self;* and that, if we reject this theory, we have to couch our criticism in terms of the theory we reject.

There is another danger. Language has many words which begin with *self:* self-possession, self-assurance, self-consciousness, and the like; and the implication is that the corresponding mental processes represent self-experiences, in the sense of p. 315. But do they? Let us take *self-consciousness* as an example. A young lecturer stands for the first time upon the platform, and a kindly soul in the audience may murmur: 'Poor young man! he is dreadfully self-conscious!' Truly, the signs are there: parched throat, burning cheeks, gasping breath, hoarse and broken voice, moist and trembling hands, uncertainty of all coordinated movements; everything that indicates what the audience, from their external standpoint (p. 313), must regard as self-consciousness; and yet there may be nothing whatever of self-reference in the lecturer's own experience. He feels timid, excited, heartily uncomfortable; but it is very unlikely that he is thinking of himself; he has too many other things to think of! Suppose that his lecture is a success, and that he steps from the lecture-room in a mood of self-congratulation; he feels relief, relaxation; he 'glows' with satisfaction and pride; but, again, there need be no sort of self-reference in his experience. Yet, in writing to a friend about the eventful lecture,

he may very well say: 'I felt terribly self-conscious when I began, but afterwards I really was a bit pleased with myself!' The personal forms are so natural as to be almost inevitable. How often, when a conversation has languished, do two or three persons with a simultaneous impulse try to revive it — by uttering a long-drawn 'I'! and how often are we surprised, when we read over a letter just written, to see that every paragraph begins with the same 'I'! Not by any means necessarily because we are thinking at the time of ourselves, but very likely because we have nothing urgent to say, and so slip instinctively into the commonest and most stereotyped pattern of speech. Language, therefore, is no more than any other movement (p. 232) an index to mind. The I-phrases and the self-words may carry a self-meaning, or they may not; it all depends upon the determination of the moment.

Do not imagine, however, that psychology alone suffers from this warp and bias of language! The tendency to personalisation (p. 205), which shows itself in the mannikin-mind and the common-sense self, appears also in the 'forces' of physics and the 'attractions' of chemistry; and if the psychologist has to clarify the current notions of mind and self, the worker in these other sciences must, on his side, come to terms with a like heritage of equivocal words. All such concepts illustrate the same speculative trend of primitive thinking; and all of them are stumbling-blocks in the path of science.

§ 77. **Consciousness and The Subconscious.** — "Consciousness," says Professor Ward, "is the vaguest, most

protean, and most treacherous of psychological terms"; and Bain, writing in 1880, distinguished no less than thirteen meanings of the word; he could find more to-day! The **ambiguity** of the term seems to be due, in the last resort, to *the running together of two fundamental meanings*, the one of which is scientific or psychological, the other logical or philosophical. *In the latter, the logical meaning, consciousness is awareness or knowledge*, and 'conscious of' means 'aware of'; *in the former, the scientific meaning, consciousness is mental experience*, experience regarded from the psychological point of view, and one can no more use the phrase 'conscious of' than one can use 'mental of.' If you think how natural it is to say 'I was conscious of so-and-so,' you will realise that the logical meaning is generally current; and if you remember that we have the terms 'mind,' 'mental process,' as names of mental experience, you will see that in psychology the word 'consciousness' is unnecessary; we have, in fact, not used it in this book, — until we came upon the popular expression 'self-consciousness' in § 76.

We have avoided the word, however, not only because it is unnecessary, but also because the logical or philosophical meaning that it tends to suggest is directly harmful in psychology. For *the psychologist has nothing in the world to do with knowledge or awareness;* he stands, in this regard, upon precisely the same level as the physicist or the chemist. Look up the word *atom* in a dictionary; you find, perhaps, that it is 'an ultimate indivisible particle of matter'; and you would smile if you read 'knowledge of an ultimate indivisible particle of matter.'

Look up *metal;* and you find ' an elementary substance possessing such and such properties '; you would think it absurd to say ' an awareness of an elementary substance ' possessing those properties. But now think of *sensation*, which is an elementary mental process (p. 65): you would probably not smile if you found ' the first stage of knowledge; the elementary way of knowing some phenomenon of the outside world '; and that is because you are thoroughly accustomed to regard consciousness as awareness, and conscious processes as processes which are aware of something beyond themselves. Yet it is every whit as absurd, from the scientific point of view, to make sensation a ' stage of knowledge ' or a ' way of knowing ' as it is to define the atom as ' knowledge ' or the metal as ' an awareness.' Science takes experience for granted, deals with the nature of things given (p. 4); so that questions about ' knowing ' or ' being aware of ' lie beyond the range of science, whether the particular science is psychology or physics.

You now understand why it is that we have avoided the term ' consciousness.' If we had said that *red* is an elementary conscious process, then you might have supposed that it is an elementary process in or by which you become aware of a red object; whereas, if we say that *red* is an elementary mental process, you have no reason to think of the red object, since ' to become mental of a red object ' is not English. It is very likely, all the same, that you *have* been thinking of the object of knowledge, in spite of the terminology of the book, and in spite of the express warning that science has nothing to do with values or meanings or uses; the statements of

a text-book, however emphatic they are, cannot always make headway against ingrained habits of thought and speech. If, then, you have at any point fallen into this mistake (and it may comfort you to know that the author, in his first years of studentship, was trapped by it again and again), go back now and read over the chapters in point; and if you discover that the mistake was partly due to the language there employed, remember that authors are human and that words are very slippery things.

So much of consciousness: what, now, shall we say of the **subconscious**? The term is fashionable; and though we have nowhere used it, we can hardly pass it by without mention. The subconscious may be defined as *an extension of the conscious beyond the limits of observation*. As an extension of the *conscious*, it tends always to be an extension of meaning beyond the *meaning* of the conscious; we do not hear of a 'submental.' As an *extension* of the conscious, it is always a matter of *inference;* what we cannot observe, we must infer. So there needs no argument to prove that the subconscious is not a part of the subject-matter of psychology. How, then, does it come into psychology?

It comes in as *an explanatory concept*, like the older concept of association (p. 146), to account for, to rationalise, the phenomena that are conscious. We have ourselves been satisfied with description and correlation, and we have therefore confined ourselves to mental and nervous processes which are in principle observable; though we have often enough been obliged to say that the facts, in this or that chapter of psychology or neu-

rology, are few or wanting. There is, however, in many minds, a craving for 'explanation'; and it must be admitted that such a craving is natural enough; for it shows in every phase of primitive thought, and may be traced throughout the history of science. Think, for instance, of the potency of explanation by 'cause and effect'! — though when we examine a case of cause and effect we never, in fact, find anything more than correlation. There are many psychologists, then, who cannot be satisfied with description and correlation; they must refer the direction of thought to a 'subconscious disposition,' and explain the connections of ideas by 'subconscious tendencies,' and so on. They have recourse to the subconscious for purposes of explanation.

We must urge two objections against this mode of psychologising. In the first place, *the construction of a subconscious is unnecessary.* Science is not called upon to 'explain' anything; description and correlation are the modern — and more modest — representatives of the 'explanation' that an older science looked for and professed to find. Secondly, *the introduction of a subconscious is dangerous.* It is a matter of inference from the conscious; but who shall draw the line, in such a case, between legitimate and illegitimate inference? When from the course of the mental stream and the interplay of mental processes we infer the existence of associative and determining tendencies in the nervous system, our argument is safeguarded. No man, it is true, has seen those tendencies in course; but the inference to them is checked and controlled by the whole vast body of fact and method that makes up modern

physiology. Things stand very differently with the subconscious. Here the inference must, it is plain, go beyond the conscious, since its aim is to explain the conscious; yet the conscious facts are all the facts we have; when once we have embarked on the subconscious, there are no more facts to steer by. Henceforth everything depends upon individual preference; and we may have many theories of the subconscious, widely different and equally plausible. The danger is that an erroneous theory of the subconscious distort our view of the conscious.

There is, however, another side to this whole question. *The notion of a subconscious has proved useful in certain fields of practical psychology, and more especially in psychiatry and psychotherapeutics; and in matters of practice utility is a sufficient justification.* Science cannot ask the physician to give up a theory which works. She can only point out that present utility is no test of ultimate truth, — there were plenty of useful inventions in the days when the physics of heat was dominated by the theory of caloric, and the physics of light by the theory of emission! — and that nobody has ever observed, or can ever observe, the subconscious at work; the wonderful things that it does testify rather to their reporter's thought and imagination, to his conscious ingenuity in explaining, than to the scientific reality of the subconscious itself.

§ 78. **Conclusion.** — So we are at an end; and as you look back over the chapters of the book, you will have your own thoughts about the work done, — about your

change of attitude from common sense to psychology, about the nature of mind, when mind is regarded from the scientific point of view, about the difficult or unsatisfactory places in psychology. The author has no wish to disturb these thoughts; every student must sum things up for himself, as every student, if he is to get the scientific point of view, must rely on his own thinking from the beginning (p. 36); for the kingdom of science is not in word but in power. There are, nevertheless, a few considerations that may be set down here, not as a summary made for you by the author, but simply as a general supplement to your own conclusions.

Realise, then, first of all, that *there is nothing in the whole wide world that cannot be psychologised.* Sound and light and heat, law and language and morals, " the whole choir of heaven and furniture of earth," all alike become subject-matter of psychology if we regard them from the psychological standpoint, as they are in man's experience (p. 9). The range of psychology is the range of that experience, and nothing more narrow. The psychological point of view is logically coordinate with the point of view of the physical sciences; these describe the world with man left out, psychology describes the world with man left in; but the psychologist surveys the broader field.

Realise, secondly, that *you have the materials and the opportunity of psychological observation always with you.* Truly, we must have laboratories; if we are to attain to accurate and comparable results, we must put ourselves under conditions that can be rigorously controlled. But get the habit of psychological observation, and you will

be surprised to find (though it follows, does it not, from the laws of attention?) how much psychology there is in your daily life; how often you can snapshot a baffling experience, and catch a hint of analytical possibilities; how often you light upon something that the text-books do not discuss, but that this habit of observation reveals and places for you. Take the occasions as they come; plenty of good astronomical work has been done with a pair of opera glasses! — and if you cannot, later on, experiment for yourself in a laboratory, at least you have gained a new outlook and a new competence; it is as if you had gained access to a whole literature by the mastery of some foreign language.

Realise, thirdly, that *a system of science, whether the science be psychology or any other, is built up of nothing else than facts and logic.* The facts of observation are the essential things; without them there is no science possible; but logic makes the facts available and rememberable; it groups and classifies, decides the sequence of chapters and paragraphs, points to gaps and discrepancies in the record of facts, governs the whole presentation. So there should be nothing more in a text-book of science than facts and logic. The man of science, trying to answer an unanswered question (p. 277), will guess and forecast and speculate and imagine; and some of his guesses and speculations may be worthy of mention in the history of his science; but there should be no glimmer of them in the scientific system. Science, you remember, is impersonal and disinterested, dry fact and cold logic; there are all sorts of personal adventures

and interesting episodes by the way, while science is in the making; but if you have the scientific temperament, you feel the fascination of fact and logic themselves.

And, in any case, they are all that science gives you! So realise, lastly, *the limitations of science; do not expect from it more than it can give.* Over and over you hear it said ' Science has failed to satisfy us about this ' and ' Science has shown itself unable to deal with that '; but ask yourself — if you deem the statements true — what are the ' this ' and the ' that,' and whether science ever gave any pledge that she would handle them. Scientific discoveries have had far-reaching consequences for practice, and have changed our whole mode of living; but the fact remains that " the most useful parts of science have been investigated for the sake of truth, and not for their usefulness." Scientific progress is reflected in the systems of logic and ethics and æsthetics, even in metaphysics itself; but theoretical values lie, as practical values also lie, beyond the purview of the scientific enquirer. Science is bound down from the outset to a certain method, the method of observation; to a certain point of view, the existential as opposed to the significant; to a certain task, the task of description and correlation. Beyond these limits, science has no pretensions; within them, she has accomplished much, and is earnest to accomplish more.

Questions and Exercises

(1) Keep a pad by you for a week, and note down the occasions when your experience is wholly selfless and markedly selfful. Describe, as well as you can, the various self-experiences.

(2) Mention some of the superstitions that connect the name with the personality (p. 313). Is there any echo of these superstitions in our own civilised experience?

(3) On p. 319 a hint is given of the way in which vision, kinæsthesis and organic sensation, and verbal ideas might come to be preferred, as vehicles of the meaning of self. Can you make any further suggestion as regards kinæsthesis and organic sensation?

(4) A well-known medical writer remarks: "Self is stomach. The function of assimilating food is the most fundamental of all the functions; it is antecedent even to locomotion and propagation. Hence anything which directly affects the organism as a whole affects the stomach." What self is here referred to?

(5) Professor Mach tells the following story. "I got into an omnibus one morning, after a tiring night on the train, just as some one else was entering from the far end. 'Some broken-down schoolmaster,' I thought. It was myself; there was a large mirror opposite the omnibus door" (see Analysis of Sensations, 1910, 4). What psychological laws does the story illustrate?

(6) What is meant by the 'unity of consciousness'?

(7) Sir Walter Scott tells the tale of a boy, always at the top of his class, who, when asked a question, "fumbled with his fingers at a particular button in the lower part of his waistcoat"; Scott cut the button off, and the boy came down from his place of leadership (J. G. Lockhart, Memoirs of the Life of Sir Walter Scott, i., 1837, 94). What is the psychology of the incident?

(8) Write a psychological criticism of the following state-

ment: "Alike in conflict, rivalry, sense of liability to punishment or vengeance, etc., the truth is continually being borne in upon the mind of an animal that it is a separate individuality; and this though it be conceded that the animal is never able, even in the most shadowy manner, to think about itself as such. In this way there arises a sort of 'outward self-consciousness,' which differs from true or inward self-consciousness only in the absence of any attention being directed upon the inward mental states as such" (G. J. Romanes, Mental Evolution in Man, 1888, 198 f.).

(9) Among the facts which have led to the hypothesis of a subconscious are (*a*) the existence of blind strivings, organic tendencies, etc., for which no conscious antecedent can be discovered; (*b*) the mechanisation of complicated movements, such as piano-playing; (*c*) the appearance in 'memory' of ideas which seem to have cropped up of themselves, *i.e.*, have no assignable physical or mental condition; (*d*) the phenomena of secondary personality (Dictionary of Philosophy and Psychology, ii., 1902, 606). How does the hypothesis help in such cases? and how does the psychology of this book take account of the facts?

(10) Consider any case of remedial suggestion, of what is popularly called faith-cure, that you happen to know at first-hand. Show how the hypothesis of subconscious agency might naturally occur to one who tries to 'explain' the facts, and show how science might deal with them apart from that hypothesis.

(11) (*a*) Satisfy yourself, by the collection of phrases, that the words 'conscious,' 'subconscious,' 'unconscious,' are used in very various meanings. (*b*) What does the word 'conscious' mean by derivation? How did it originate?

(12) The complaint is often made that scientific men do not popularise their results. What do you take to be the great stumbling-block in the way of popularisation?

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On beliefs connected with names, see E. B. Tylor, Researches into the Early History of Mankind, 1878, 123 ff.; J. G. Frazer, Taboo and the Perils of the Soul, 1911, 318 ff.

APPENDIX

Dreaming and Hypnosis

I am assured that a lady of a well-known court saw in a dream and described to her friends the person she afterwards married, and the hall in which the betrothal was celebrated; and she did this before she had seen or known either the man or the place. They attributed the circumstance to some indefinite secret presentiment; but chance may produce this effect, since it is quite rare that it happens; besides, dream-images being somewhat obscure, there is more liberty in connecting them afterwards with certain others. — Gottfried Wilhelm Leibniz

§ 79. **Sleep and Dream.** — The profound sleep that comes to us every night, and that we take entirely as a matter of course, rests without any doubt upon an instinctive tendency; but there can be little doubt, either, that the instinct has been modified in the course of human evolution. *It seems probable, indeed, that profound sleep, the lapse of all but the vegetative organic functions, has been developed from the same fundamental tendency as hypnosis*, so that natural sleep and artificial hypnosis represent two branches which spring from a single stem. This original and instinctive tendency is toward what we may call, in biological phrase, a **partial or defensive sleep**, a rest enjoyed while the animal is still partly on guard. It underlies the sleep of the mother, who is roused at once by the movement of her infant child; the sleep of the nurse, who is awaked by the restlessness of her patient; the sleep of the tired horseman or driver, who keeps the saddle or holds the reins, and remains alive to any sign of uneasiness on the part of his horse. It shows also in the ability of the wearied surgeon to rouse himself and perform an operation, though he falls asleep once more the

moment it is over and has no remembrance of it at his normal waking. Such a partial rest, persisting only thus occasionally in the life of civilised man, is all that an animal surrounded by dangers can afford; if sight and smell and taste may be allowed to lapse, still touch and hearing must keep awake, — must keep awake, at any rate, to the kind of stimulus that spells danger. We are speaking now in figurative terms; the history and nervous mechanism of the sleep-tendency offer a problem to science, and must be scientifically worked out; but it is enough here if you get a general notion of the way in which sleep began.

In process of time, as dangers grow less or as the nightly care of the community is put into the hands of watchmen whose special duty it is to signal their approach, *sleep becomes total and profound*. Even our own protected sleep, however, is not always undisturbed. We resign ourselves to it with a full sense of security; and we go to sleep in a dark and quiet room, we rid ourselves of the friction of clothes, we keep a constant temperature in our bedroom, we lie down. Sleep, nevertheless, is interrupted, more or less often according to age and constitution, by a **dream**, by a series of experiences like those of the waking life; and sometimes the dream is accompanied by muscular activity; we talk or walk in our sleep.

The dream, then, is subject-matter for psychology; and the first question that we have to ask about it concerns its make-up; *of what mental processes is the dream composed?* The answer is twofold. So far as *pattern* goes, anything whatsoever may appear in the dream-state: perception, memory, emotion, imagination, thought, everything. But as regards the *mental processes* themselves, the dream is selective; certain processes are preferred for dreaming, so to say, as certain processes are preferred for the representation of self. The details of dreams are very quickly forgotten; and there is always danger lest recall and report, in the waking state, change the terms of a dream, translate them from

their original mode into the customary terms of waking experience. We have, however, a large number of records, taken under favourable conditions, and we find substantial agreement among the various observers. Dreams are mainly visual, though lights are more and colours are less common, perhaps, than is ordinarily supposed. Next in order of frequency to vision stands audition; conversation, especially, is a common feature of dreams. Next follow sense-feelings and feeling-attitudes; unpleasant experiences seem, on the whole, to be more frequent than pleasant, though there are marked individual differences. Thereafter, at a wide remove, come touch and kinæsthesis and organic complexes; and last of all, taste and smell.

We know so little of the nervous correlates of the dream that a discussion of these facts must of necessity be speculative. It has been said that we dream largely in terms of sight for the same reason that we remember and imagine largely in those terms ('dream' is, for that matter, the older English word for 'imagine'): the eye is the most important of all the sense-organs, the organ most continuously used, and the organ most relied upon for knowledge of the outside world; hence the visual centre of the brain has multitudinous connections with all the other brain-centres, and is readily excited when any one of them is excited. It has been pointed out, also, that the eye is extremely sensitive to slight changes of illumination, as well as to changes in the pressure of the eyelids, the state of circulation in the retina, and so forth; and that the sensations thus set up are reinforced by the persistent central grey. Observation has proved that the figures of a dream-scene may roughly correspond with the dots and splashes of light and colour that you see over the dark field of vision just before you fall asleep. So in regard to hearing: it may be said that verbal perceptions and ideas are, in the waking life, subordinate in number and importance only to those of vision; and it may be said, also, that the ear is the great defensive organ of the night-time, so that ear-sleep (if

we may coin the word) is rarely profound, and the ear is liable to excitation by any chance crack or rustle in our surroundings, even by the pulsing of the blood through its own vessels. Here, indeed, we raise the whole difficult question of *the origination of dreams*. We cannot say that a dream may not arise 'in the brain' altogether apart from stimulation of a sense-organ; yet the sense-organs are always liable to stimulation, from without or from within; we know that stimuli, too weak to arouse a sleeper, will set up dreams; and it seems safe to conclude that most dreams are originated by sensory stimulation, while their subsequent course is due to associative and perhaps to determining tendencies active at the moment. Attempts have been made to refer certain familiar kinds of dream — dreams of flying, falling, appearing in public scantily clothed, preparing for a journey, etc. — to particular forms of stimulus: arrest of heart-beat, irregular breathing, cold from the slipping down of bed-clothes, etc.; but no positive correlation has been arrived at.

Dreams are ordinarily regarded as the type of fantastic and disordered experience, "the children of an idle brain, begot of nothing but vain fantasy"; and some dreams, it is true, are very fragmentary, and some dream-combinations seem ridiculous enough to the waking judgement, and some shifts of dream-scene are startlingly abrupt. It may be questioned, nevertheless, whether the changes are in fact more sudden or more radical than those of the waking life, and whether the grouping is more fantastic than in the day-dream. *The great perceptive attitudes remain for the most part unchanged.* We notice, on later reflection, that time may be curiously foreshortened, so that we have the events of a day crowded into a few seconds; but this is due partly to the occurrence of attitudes, of the nutshell-packing of experiences (p. 271), such as we find also in our waking memories, and partly to our own reflective reading of the dream; we, who are now awake, distribute the events over a day, much as the novelist may do in telling his story, or the playwright in developing

his plot. *The sense of personal identity is rarely lost;* and the dream frequently reflects the personality of the dreamer; temperament, interests, principles, show themselves in it; no one of us could dream his neighbour's dreams. In general, too, *the dream plays about a topic or situation;* and if the changes are both sudden and profound, we must remember that our waking trains are held in course, as dreams are not, by the continuity of the stimuli around us, and that even so we are often interrupted in a current train, and shift from topic to topic at a moment's notice. The dream is under no external control by an environment, nor is it as a rule organised and regulated throughout by a dominant determining tendency, as is the case with thought and constructive imagination. It is subject, however, to the laws of associative tendency, and sometimes at any rate it seems to issue from a determination; a dream may, for example, be continued on successive nights. On the whole, then, *dream-experience is less disorderly than is usually supposed.* Our statements must be guarded: we cannot say that the perceptive attitudes are never disturbed; we know that personality may be greatly modified; we know that scene may follow scene in the most bizarre way. The whole trend of popular psychology, however, is to emphasize the differences between dreaming and waking, while the trend of accurate observation is to bring them together.

The *dream-incidents* are derived, in the lighter stages of of sleep, mainly from the incidents of the preceding day, and in the deeper stages mainly from the remoter experience of the waking life. This is what we should expect from our knowledge of the temporal course of associative tendencies. Moreover, we know that, in profound sleep, the brain is comparatively bloodless; and it is reasonable to suppose that, in dreaming, the activity of the tendencies is local and sporadic. That would account for the *incongruities* that our waking judgement discovers in the dream-situations, and also for the general *ineffectiveness* of dream-thought. When,

however, we enquire further into the nervous mechanism of dreaming, we must enter the realm of hypothesis. *It is a real puzzle*, for instance, *that we do not oftener walk and talk in our sleep;* for dream-ideas are vivid, and the vivid ideas of the waking life are ordinarily followed or accompanied by action. We may guess that there is a positive blocking of the nerve-paths that lead from sensory to motor centres in the brain, or from the motor centres to the muscles; else the dream would surely be talked or acted out; but we can say nothing definite about this motor inhibition. The organism at large seems to be under a ' negative suggestion ' in regard to movement; for the pattern of action — though, like all the mental patterns, it may appear in the dream-state — is notably less frequent than the patterns of perception and idea and emotion.

We said that dream-ideas are vivid; and there is no doubt that dreams in general have an *hallucinatory* character; dream-images are extremely vivid, dream-scenes are staged in what is taken for objective space, dream-events occur without any felt dependence upon the dreamer. This impression of the reality of dream-incident is partly due to a negative condition; we have no means, in the dream-state, of testing or checking what happens. In the waking life we compare experience with experience; in the dream there is nothing with which the present train of ideas may be compared. It seems, however, that the hallucinatory character is native to our dream-ideas, that it is due to positive as well as negative conditions; though, again, we cannot say what the conditions are, until we know more about the nervous correlate of dreaming. The net result is that, in popular phrase, *we take our dreams for granted;* the dream-world, so long as we are in it, appears as real as the world of our waking existence. This does not at all mean that we accept, blindly, everything that takes place. We may protest and criticise in dreams, just precisely as we protest and criticise in real life; we may dream that we are dreaming, just as we some-

times say ' I must have been dreaming ' when we give a wrong account of some waking experience or find ourselves mistaken in a recollection; and we may have a sense of unreality in dreams, just as we have it now and again in waking situations. It means only that the nervous system of the dreamer is stamped with the great biological tendencies that we have noted and discussed; the tendency to take things as real is present by night as well as by day.

The old common-sense notion that dreams are prophetic has no foundation in fact. The idea that underlies it — the idea that dreams must be of some use to the organism — nevertheless persists, and has found recent expression in a comprehensive theory of dreams. *The theory is that all dreams, if one interprets them aright, represent the fulfilment of a wish, entertained in the waking life but repressed by circumstances.* The organism attains by night, though in veiled and transmuted shape, what it has failed of attaining by day. This theory has been elaborated and illustrated with very great ingenuity; but *its claims are too sweeping.* Recent observations seem to show that the wish-dream is likely to occur in the hours before waking, rather than in the early hours of the night or in the middle period of profound sleep; that many dreams cannot be interpreted, even with the best will, as fulfilments of wish; and, in particular, that fear-dreams form a category as distinct and ultimate as wish-dreams. The merit of the theory is that it emphasises the feeling-processes of the dream-life; it does not give us the key to the psychology of dreaming.

§ 80. **Hypnosis.** — We have seen that there are two lines of development from partial or defensive sleep; and that hypnosis is the final term of the one line, as normal deep sleep is the final term of the other. *Hypnosis may therefore be regarded as a state in which the organism is partly asleep, and partly alert and awake.* The wakefulness is characterised by a high degree of attention; and the hypnotised subject

is accordingly liable to suggestion by anything that fits in with the direction of attention.

The symptoms of hypnosis do not follow any stereotyped pattern; so that *it is difficult to draw a generalised picture of the hypnotic individual.* If, however, we are willing to run the risk of generalisation, we may distinguish three successive stages in the phenomena. The hypnotised subject is at first **heavy or drowsy**; his behaviour is like that of a man suddenly aroused from sound sleep, and not yet 'come to himself.' Then follows the stage of light hypnosis or, as it is technically called, the stage of **catalepsy.** The subject is to some extent anæsthetic; his sense-organs are closed to all the ordinary impressions from the outside world. At the same time, he hears what is said to him by the operator, and performs any action that the operator may suggest. He does nothing without the word of command; so that he will maintain a position, however uncomfortable it might be under ordinary circumstances, until the order comes to relax it. On waking, he remembers cloudily what took place during hypnosis. In the third and final stage, which is known as **somnambulism,** the anæsthesia becomes more complete; and the subject not only acts, but also perceives, at the bidding of the operator; takes coal for sugar, ink for wine, tapping on the table for the playing of a violin, and so forth. On waking, he has no memory of what has taken place.

We see, then, that *there are four main symptoms of hypnosis: anæsthesia, motionlessness, suggestibility and amnesia*; and it is worth while to remind ourselves, at once, that all these symptoms have their counterparts in the normal waking life. Thus, a child falls down and hurts itself; it may be crying bitterly; but you distract its attention by a toy, and the crying stops and the pain is forgotten; the diversion of attention has meant anæsthesia. Again, you are on a country walk with a friend, and you begin to discuss some topic of mutual interest; you both get more and more absorbed,

and you both walk more and more slowly, until presently you find yourselves at a standstill in the middle of the road; concentrated attention has meant arrest of movement. If the lecturer in a class-room says: 'I want you now to take down what I am going to say,' the suggestion is immediately accepted, and the whole class makes ready to write. Finally, we are all forgetful of what happens in a particular situation if circumstances change and we are confronted by another situation; how many of us remember our dreams? The new day brings its novel situations, and the dreams drop out of sight; and the change from dreaming to waking is no greater than the change from the hypnotic to the normal state. Hence the peculiarity of hypnosis is not the introduction of strange or curious phenomena, but rather the grouping, in an extreme and unusual way, of phenomena with which we are in principle familiar.

It would seem to follow from this analysis that *we are all and sundry liable, under certain favourable conditions, to fall into the hypnotic state;* and that conclusion is borne out by the facts. Only idiots and infants are exempt from hypnosis; and they are exempt only because of the low development of attention, because they cannot, under any conditions, concentrate or 'pull themselves together.' When people tell you that Professor So-and-so tried to hypnotise them, but that their will proved too strong for him, you may reply that they do not understand what they are talking about; it would be as logical for them to assert that the champion tennis-player of the world had failed to beat them in a match, because they had refused to lift a racquet. The stronger the 'will,' that is to say, the stronger the habit of absorbed attention and the greater the power of dominant determinations, the easier is the induction of hypnosis. Moreover, as human beings are one and all liable to be hypnotised, so do we find that the animals, in their degree, are liable to something like catalepsy. The nightly sleep of birds and the winter-sleep of many animals is a cataleptic sleep; very many

insects ' sham dead,' as we say, when they are surprised or handled; and animals may be thrown, by manipulation, into an artificial state which resembles catalepsy in ourselves, and which has received the like name of **cataplexy** (' catalepsy' is a seizure, and ' cataplexy ' is a stroke).

So much for the primary facts: what, now, of the ' operator '? Well, it is quite possible to hypnotise oneself, just as it is quite possible to put oneself to sleep by counting sheep or listening to an imaginary rain. One has only to *mean* or *intend* to oneself that the hypnotic state is coming, and — if there is no interruption — it will presently come; self-suggestion or autosuggestion may be as effective as the suggestion of an operator. For *in every case the influence that the operator has over the subject is an influence given him by the subject;* the immediate conditions of hypnosis lie in the subject himself, and not in the personality of some other man. The professional operator has, it is true, two advantages. He asserts emphatically that he ' can hypnotise '; he advertises; and we tend to believe emphatic and repeated statements, however groundless they may really be; so that we are likely to give him an influence over us before we have even seen him. Secondly, the operator knows, from long experience with hypnotised subjects, how the individual shall most readily be brought into the hypnotic state, how (that is) his complete attention may be secured and directed: whether by coaxing or by bullying, whether by strokes of the hand that suggest a gradual flow of power or by a smart blow on the back of the neck that produces a momentary helplessness and confusion. *All the ' methods ' of hypnotising are so many tricks to bring about a state of undivided attention and a corresponding suggestibility in the subject.* So the operator has genuine advantages, but they are advantages that might be secured by anyone who took the trouble; they are not connected with special gifts or superiorities.

Here, however, you may raise an objection; you will say that operator and subject are *en rapport*, that there *is* a

special bond which connects them, and that the records of hypnosis prove it. Yes, there may be a special bond; and yet the preceding paragraph sets forth the truth about the operator. Do we not all believe in our own physician, our own family lawyer, our own clergyman? and yet our neighbours make different choices. Supppose, then, that you have first-hand evidence of the powers of some platform operator, or of some physician who treats his patients hypnotically; you may very easily come to think that this particular man has a peculiar control over *you*. You may suggest this belief to yourself, or perhaps the physician — not wishing to have his case interfered with by others — may suggest it to you; in any event, you are imbued with the idea that this man, and this man only, is able to treat you; and it then follows, naturally, that the required concentration of attention and the required openness to suggestion can be secured only when he is present. But the *rapport* is, after all, nothing more than *an insistent belief of your own;* it is neither more effective nor less intelligible than would be the contrary belief that a certain person of your acquaintance could *not* hypnotise you. So far, therefore, from invalidating our former conclusions, the occasional existence of the *rapport* serves to confirm them.

We now turn from the hypnotic state itself to its relations with the waking state; and the first point to consider is the fact of **post-hypnotic or terminal suggestion.** Suppose that an operator suggests to the hypnotised subject that a certain action is to be performed at such-and-such a time after waking; " before I wake you let me impress upon you that you are to drink two glasses of water at five o'clock this afternoon; you understand? — two glasses of water at five o'clock." The subject rouses; has no memory of the command; and yet, when the time comes, obediently pours and drinks the water. The fact is, you see, that the suggestion of *time* builds a bridge between the two separate states, the hypnotic and the waking; the idea of time is common to

both. Hence when the suggested time comes round, and the subject knows — by the clock, by the sun, by his occupation, by his organic sensations — that five o'clock is approximately here, this idea acts as a suggestion; the hypnotic state is reinstated for a while, though probably in weakened form; and the action is performed. As soon as it is over, the subject is his waking self again.

We have the obverse of this post-hypnotic suggestion in the phenomenon of **double consciousness**. A subject is hypnotised and becomes somnambulistic; when he is waked, he has no memory whatsoever of the events that occurred during the hypnotic state. Later, he is hypnotised again; and now it turns out that he remembers what took place during the previous hypnosis. So he seems to have a double consciousness; the normal waking consciousness, which is sensibly continuous in his waking states, and a secondary hypnotic consciousness, which is continuous from one state of somnambulism to another. There is, again, nothing mysterious in the facts; we have their parallel in the normal shifts of personality; we have seen that a man is a different self in the office, on the golf-links, with his children in the nursery; and we have now only to add that the known laws of memory are adequate to these phenomena of double consciousness. For we do not pass in thought from one situation to another unless the situations are connected by some idea which is common to them both; the hard-worked professional man, when he is on the links, *forgets* the office; that is the reason for his play; and he forgets the office because there is no community of ideas between his work and his recreation. In hypnosis, too, we break sharply with the waking life; if the two are to be connected, a bridge must be built *ad hoc* by the operator; but when we relapse into hypnosis we pick up again the thread of our hypnotic memory, as naturally as the professional man picks up his work when he seats himself at his desk after a half-holiday.

There are still a couple of questions, often asked by students,

that you may care to have answered; and the first of them usually takes the form: *Can a man be hypnotised against his will?* To which the author's reply always is: It depends on what you mean by 'against his will.' For consider! There is no reason at all why we may not, any one of us, be taken off guard and surprised into the hypnotic state. We have probably all been surprised by sleep during a lecture or a sermon; the conditions were favourable, and we nodded. So the conditions may be favourable for hypnosis; and if someone is watching us, and sees that the conditions are favourable, he may have us hypnotised before we know where we are. The risk is not great; but the possibility is there. Again, if a patient has fallen into the habit of taking hypnotic treatment, and if he has thus slipped into a position of invalidish dependence upon his physician, so that obedience to the suggestion of hypnosis has become natural to him, then it is entirely likely that the physician's command would induce the hypnotic state, even if the patient at the time should not desire it. And what holds of physician and patient holds of any operator and any subject in like circumstances; the habit of obedience grows by obeying. In this sense, then, one might be hypnotised 'against one's will.' If, however, the question means what it is probably intended to mean: Can another man come to me and, by virtue of some inherent power, force me into hypnosis in spite of my resistance to that suggestion? then the answer is No; no more than a man can force you to lend him money or to perjure yourself for him in a court of law. It is you who must entertain his suggestion; so long as you refuse to do that, you are immune to hypnosis at his hands.

The other question concerns the value of hypnosis for medical or therapeutic purposes; *can hypnosis effect cures? can it replace the anæsthetics of ordinary medical practice?* It has, as a matter of fact, received fairly extended trial as an anæsthetic; and while it has allowed many operations, minor and major, to be carried out successfully, it is far less reliable

than the anæsthetic drugs; mainly, no doubt, because it cannot be administered by the physician, as drugs can, but depends upon the attitude of the patient himself. There is no future for hypnosis in this connection. As to its therapeutic value, we can only say that whatever can be accomplished by suggestion, in the normal life, can be accomplished by the very strong suggestion of hypnosis in the disordered life. A suggestion can initiate, modify, and arrest movement; a sharp rebuke will start a child into activity, or change his occupation, or stop a present misdeed and prevent like misdeeds in the immediate future. A suggestion, again, can make us blush; and a suggestion can make us cry. Here, then, is the therapeutic value of hypnosis; it may arrest or remedy habits like alcoholism, and it may act upon derangements of circulation and secretion. Farther than this it cannot go; and even within these limits its utility is variable. Some children obey the first word of command, and others must be bidden over and over again before they do as they are told; some of us blush easily, and some hardly ever; some are readily stirred to tears, and some with great difficulty. So it is with the liability to hypnotic suggestion; everyone is liable, but not everyone to the same degree. Besides, as we saw just now, the habit of hypnosis grows, like all habits, upon him who has formed it; the patient may develop a craving for the hypnotic treatment, and in this way may take on a habit of dependence, of constant reliance upon others, which is as afflicting and demoralising as the disorder which the treatment was meant to cure. So that, on the whole, *hypnosis should not be lightly appealed to; the decision should in every case remain in the hands of the experienced physician.*

There is one other effect of hypnosis that we have not spoken of in detail, and that is of great psychological interest; the somnambulist, we said, will *perceive* as the operator wishes him to perceive, will take coal for sugar and ink for wine. It has long been debated whether this statement is literally

true. The hypnotised subject behaves *as if* he perceived the sugar and the wine; but is there any reason to think that he actually perceives them? Or if the suggestion is negative, and the subject is told that a certain person has left the room, he will behave *as if* that person were no longer present; but does he actually fail to see him? May not the suggestion bear directly upon the subject's conduct, and leave his perceptions unchanged? The facts point in both directions. Many of the apparent changes of perception are, in all probability, nothing more than changes of behaviour towards the perceptual stimuli; but there is, all the same, no impossibility in a change of perception itself. We have already noted the negative effects of abstraction (p. 281); and recent experiments with normal subjects seem to show conclusively that a suggestion, a form of words that carries the force of a command, may set up the mental process, or the change of mental processes, normally correlated with presence or change of external stimulus. A red, seen under the suggestion of blue, will not only be reported *as* bluish, but will actually *look* bluish; and a thermally indifferent impression will not only be reported *as* warm or cold, but will actually be *felt* warm or cold. If such things happen in the normal waking life, they may assuredly happen in the narrowed and intensive suggestibility of the hypnotic state.

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